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ABSTRACT

Preliminary findings of a study that identified characteristics of federally funded change agent programs are presented in this paper. The study examined four federal change agent programs: Elementary and Secondary Education Act (ESEA) Title III, Innovative Projects; ESEA Title VII, Bilingual Projects; Vocational Education Act, Part D, Exemplary Programs; and the Right-to-Read Program. Data from a national survey of 225 projects in 18 states and case studies of 30 projects were analyzed to determine which factors systematically affect the change process. Project designs were categorized by goals, educational approach, change strategy, and resources. Independent variables of the institutional setting--district size, wealth, expenditure per pupil, source of financial funding, community demographics, and the superintendent--were analyzed for their effects on a school district's "innovativeness." The districts most likely to adopt innovative programs were larger; had higher density school enrollments, adequate budgets, higher family incomes, and more experienced superintendents; and were less dependents on state aid. Thirteen tables are included. The appendix contains methodology notes and eight statistical tables. (Contains five references.) (LMI)

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PRELIMINARY DATA ANALYSIS OF CHARACTERISTICS OF CHANGE AGENT PROJECTS

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PREFACE

Rand is conducting, under the sponsorship of the U.S. Office of Education, a two-year study of federally funded programs designed to introduce and spread innovative practices in public schools. These change agent programs normally offer temporary federal funding to school districts as "seed money." If an innovation is successful, it is assumed that the district will continue and disseminate part or all of the project using other sources of funds. The Rand study examines four such federal change agent programs--Elementary and Secondary Education Act Title III, Innovative Projects; Elementary and Secondary Education Act Title VII, Bilingual Projects; Vocational Education Act, Part D, Exemplary Programs; and the Right-to-Read Program. The study identifies what tends to promote various kinds of changes in the schools and what doesn't; in particular, the Rand study will identify for federal, state, and local policymakers the quality, permanence, and extent of dissemination of innovations that are associated with the various federal programs and with various federal, state, and local practices.

A series of reports will describe the results of the first year of the Rand study (July 1973-July 1974). Volume I (R-1589, *A Model of Educational Change*) will provide a theoretical perspective for the Rand study by analyzing the current state of knowledge of planned change in education and by proposing a conceptual model of factors affecting change processes within school districts.

Volume II of the series (R- , *Characteristics of Change Agent Projects*) will contain the analysis of survey data collected by a national sample of 225 projects in 18 states during November and December 1973.

Volume III (R- , *The Process of Implementing Change*) summarizes the results of 30 case studies of change agent projects conducted by Rand staff members and consultants in 25 school districts during April and May 1974. These case studies were

chosen from the original sample of 225 projects initially survived. Volume III also describes the role of state education agencies in choosing and disseminating the change agent projects.

Volume IV (R- , *Synthesis of Findings*) summarizes the findings of Volumes I, II, and III, and also synthesizes extensive data collected by Rand on federal level program strategy and management for each of the change agent projects. Volume IV also includes a discussion of alternative federal strategies for promoting innovation.

There will also be an executive summary volume which presents a summary of the study's methods and results for a general audience. Finally, there will be two technical appendices, one containing brief summaries of each of the 30 case studies analyzed in Volume II, and the second including a detailed description of the genesis, innovation strategies, and management styles of each of the federal change agent programs analyzed in this study.

The second year of the study will collect additional data on Titles III and VII of ESEA, with particular focus on projects whose federal funding has expired. The final report of the second year's work will be issued in December, 1974.

This Working Note outlines the progress made on the data analysis for Volume II. Both the results discussed and the approach indicated are preliminary and will be refined, elaborated on, and extensively added to for the final report. The purpose of presenting these early findings is to provide a means for eliciting comments and suggestions for subsequent analysis. For a detailed outline of Volume II, see *Revised Data Analysis and Reporting Plan*, WN-8754-HEW, July 1974.

CONTENTS

I. INTRODUCTION

A major objective of the Change Agent Study is to identify for federal, state, and local policymakers the quality, permanence and extent of dissemination of innovations in local school practices that can be expected for specified combinations of project characteristics and institutional settings. To accomplish such an ambitious objective requires a variety of overlapping data collection and analysis techniques. This Working Note presents a preliminary statement about the quantitative analysis efforts of the Change Agent Study. We will describe the basic approach in general terms and indicate detailed aspects of the analysis to date. At this early stage, it would be premature to offer policy-relevant interpretations of our preliminary investigations. Accordingly, we refrain from such interpretations; rather we present pieces of the analysis so that the reader may better understand the direction of the inquiry.

AN OVERVIEW

The ultimate objective of federal policy in the area of innovative projects is to improve the education of children by introducing changes into the educational process. Volume I of this series argued that the relationship between federal policy and the desired objective cannot be systematically formulated without analysis of the processes of change within the school district.

In particular, the process of change begins with the introduction of an innovative project and goes through the following three stages:

(1) support
(2) implementation
(3) incorporation

The support stage is that initial period in the life of an innovative project when plans are conceived and formulated, money and resources are sought, and decisions are made by the local school officials as to which projects they should select and back. In the second stage, the project confronts the reality of its institutional setting and implementation begins. In many projects--particularly those that ultimately cause significant change in educational practices--implementation involves a process of mutual adaptation in which the initial characteristics of the project are adapted to the school and class environment, and the teachers, principals, and other relevant actors adapt their behavior to the requirements of the project. The final stage involves either the incorporation of the project (in part or whole) into the standard practice of the district or its demise.

The data analysis will attempt to determine which factors systematically affect the change process sketched above. Figure 1 presents a schematic diagram of those factors that the literature suggests play a major role in the innovative processes. Using this conceptual model (which is discussed in detail in Volume I), the analysis will operationalize many of the concepts indicated by Figure 1 and investigate their interrelationships by means of statistical techniques. In particular, we will measure, describe, and characterize

- o project characteristics
- o institutional settings
- o project outcomes in the areas of success, implementation, behavioral change, and continuation
- o federal and state policy inputs

Moreover, we will estimate, and test hypotheses about, the extent to which the various project characteristics affect project outcomes given different institutional settings and federal and state policy inputs.

All measurements to be discussed below are based upon a nationwide survey of a sample of 289 innovative projects and intensive field work in 30 projects. The survey, which was administered by the National Opinion Research Center in approximately 200 school

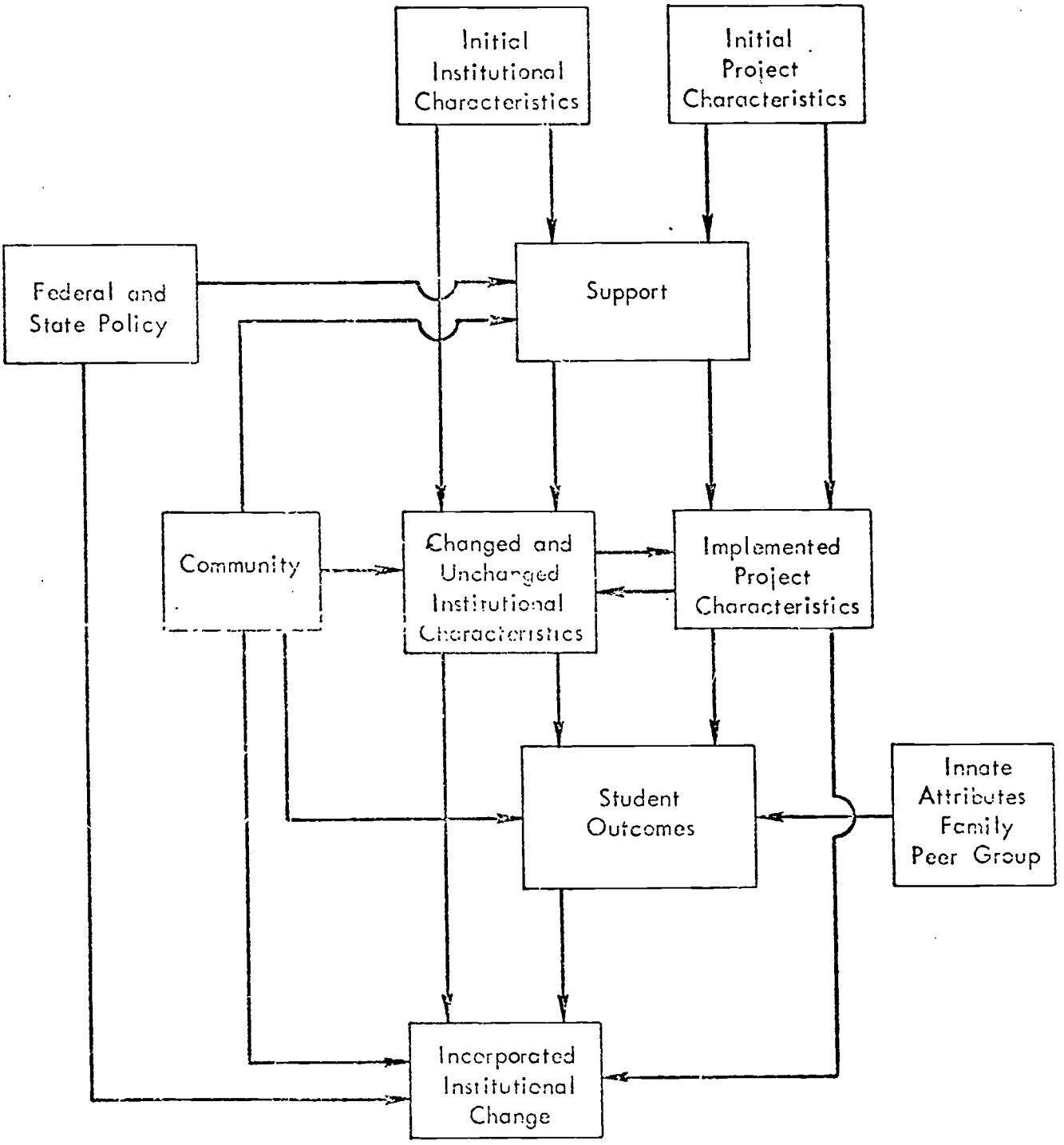

Fig. 1

Schematic Diagram of Factor Affecting Changes in LEA

districts in 18 states, consists of a multi-level series of questionnaires. Superintendents, federal program managers, project directors, principals, and teachers were interviewed and asked to provide information and express opinions about the characteristics of these projects, about the innovative process, about their role in this process, and about the federal and state role in fostering innovation and dissemination. In addition to the survey data, quantitative data drawn from such other sources as census data, OE files, ELSEGIS data files, and interviews with state educational agency officials are used. The appendix to this report examines the representativeness of the survey and field work sample.

The data were collected for different levels in the school organization because we believe that decisions, processes, and the type of information available vary with the level involved. For example, we expect that the superintendent and school district officials play major roles in the support and incorporation stages but often do not directly affect the implementation stage. Accordingly, our analysis is composed of two phases--that of the implementation of the project involving teachers, principals, and project directors, and that of the support and incorporation stages involving higher school officials.

Since implementation necessarily depends on the way teachers translate project design characteristics into reality in the classroom, the measurements, descriptions, and statistical analysis of implementation focuses on teachers and how they respond to the project. In symbolic terms, we will be estimating equations of the following form at the individual classroom level:

Teacher Implementation Outcome = f (Project Characteristics, Institutional Setting, Federal and State Programs and Policies)

The implementation outcome will be measured by the responses of teachers (n≈690) to questions about success, difficulty of implementation, the

extent to which the project was implemented as originally laid out, and the extent to which teachers believed they changed their behavior as a result of the project. Section II of this Working Note describes our progress in the exceedingly-difficult task of characterizing the projects. Volume II will treat the measurements of the other variables and present the estimations.

The second phase of the analysis will deal-insofar as possible--with the school district level and questions of adoption, continuation, and dissemination. The reason for this second phase is that (a) for federal and state policymakers, a highly-relevant policy outcome concerns the school district's decision to commit local resources to the continued support of a "successful" project when federal funds expire and (b) the superintendent's evaluation of a project and his willingness to commit resources to it depends only weakly--according to our preliminary analysis--on how "successful" the project implementers perceive the project to be. In short, we will consider the "implementation outcomes" of the project to be an input to the decision processes involving continuation and dissemination. In symbolic terms, we will estimate equations of the following form at the school district level (n≈190):

> Incorporation and Perceived Success = f (Perceived Implementation Outcomes, LEA Characteristics, Project Characteristics, and Federal and State Policy)

Since progress on this second phase depends upon completion of the analysis of the implementation phase, this Working Note can present (in Section III) only one piece of the school district analysis--namely, the characteristics of the LEA that we call innovativeness.

II. PROJECT CHARACTERISTICS

One of the reasons why the range of diverse innovative projects tried at the local school district level is so hard to characterize is that different dimensions are implicitly involved in their design. Therefore, to describe these projects systematically, we find it convenient to categorize any project into its characteristics on four components of project design:

(1) focus or goals
(2) educational method or approach
(3) change, or implementation, strategy
(4) resources

The focus, or goals, of the project is the collection of objectives of the innovation--be they highly specific, such as "increased reading scores of under-achievers in grades 3-6," or highly diffuse, such as "improve the humanistic learning of children." The educational method or approach is the specific technique applied in the teaching process to reach the goals--e.g., an open classroom or a SWRL reading method. The change strategy is the group of activities employed by the project to implement the educational method--e.g., the amount of staff training. Finally, the resources specify the scope, scale, and intensity of the effort.

FOCUS

Determining the focus of innovative projects has proved to be an extraordinarily difficult task. Even ignoring for the present analysis the personal and sometimes "hidden" goals of individuals involved in the project, the catalogue of project objectives is long and highly diverse. For such federal programs as Right-to-Read, there are ostensible common goals that, however, tend to subdivide into rather different specific objectives. For State Title III and Federal Title III,

no requirement of common purpose exists and the projects are accordingly particularistic. Nonetheless, systematic comparisons require that project goals be abstracted and grouped. Table 1 lists a categorization of the primary focus of the innovative projects in the Rand sample.

This categorization was formulated by means of a content analysis of titles, abstracts, and other available information about individual projects in the Rand sample. Of course, most projects could be described by more than one category--e.g., reading projects could be targeted towards special problems in the school. However, we believe that many projects have a *raison d'être* implying a dominant focus (of the type listed by Table 1) from which design specifications follow.

Table I categorizes the primary goal or focus into four major divisions--curriculum changes, school changes, targeted change, and extra services.

Curriculum Changes

Many educational innovations are oriented towards changing curriculum. In particular, there were four major areas of curriculum change. First, there were projects that aimed to enrich the curriculum in the sense that a new class or subject of instruction was *added onto* the existing core curriculum. The following substantive foci were identified in this enrichment category:

- o Environment
- o Career Education
- o Drug Abuse Education
- o Music or Art
- o Physical Education
- o Drop-out Information
- o Ethnics and Humanistic

Another collection of projects focused specifically on improving the reading curriculum. Some of these innovations dealt with remedial reading others adopted pre-designed reading packages or technologies. Third, some projects were mathematics improvement programs that

Table 1

PRIMARY FOCUS OF INNOVATIVE PROJECTS

Curriculum Changes
- Enrichment
- Reading
- Mathematics
- Language Development

School Changes
- Classroom
- Organization
- Technology
- Staff Training
- Parents Involvement

Targeted Change
- Coping with Special Problems or Needs
- Cultural Groups

Extra Services

spanned the range from computer-assisted instruction to the use of the Nuffield approach. A final group of projects concentrated on development of language skills.

School Changes

A number of innovations apparently derived their design requirements from ideas about how and what to change in the schools. Five different foci of change emerged in the Rand coding. First, there were such classroom change projects as open classrooms and peer instruction. Other innovations aimed beyond the classroom to the larger organization of the school or school district--e.g., alternative schools. Another group of projects introduced new technologies involving hardware--e.g., television or computers--into the life and educational repertoire of the school. Some innovations involved the explicit training of staff to new ways that could change their usual roles and behaviors. Finally, a number of projects focused on bringing parents into an active relationship with the school.

Targeted Change

Targeted change represents another category of goals pursued by these projects. In particular, some innovations were designed to cope with special problems or needs in a school or district--e.g., projects ranging from Harlem Prep to handicapped-children programs. In addition, "cultural groups"--e.g., Spanish-speaking students or American Indians--were targeted.

Extra Service

A final category involved programs providing such extra services to the classroom, school, or district as resource centers or library facilities.

EDUCATIONAL METHODS

The designers of projects at the level of the local school district may not, and often do not, plan in neat analytical terms that separate means from ends. Rather they begin with a set of ideas consisting of an intermixture of goals, techniques, and strategies.

Nonetheless, we need to separate these aspects of projects. Accordingly, this section suggests an analytical classification of the educational method or approach of the innovations in the Rand sample.

We asked project directors of 289 projects to check off the educational techniques employed in their project. Table 2 presents marginal results. A glance at the numbers of techniques mentioned suggests that most projects used several methods in combination. The possible combinations of the twenty distinct methods are very many indeed. However, statistical analysis shows that various educational techniques tend to be associated with each other so that the twenty techniques may be grouped into a small number of discernible patterns. Table 3 displays the results of a factor analysis designed to discriminate the smaller number of patterns.*

The following five analytical types of educational methods emerged from the factors analysis:

- Behavioral modification techniques involving such methods as student performance incentives and various technological innovations.
- Enrichment programs involving heavy components of field trips and community resources and clearly not involving diagnostic methods.
- Classroom organization methods typified by open classrooms, non-graded or ungraded classrooms, and team teaching.
- Intensive staffing of traditional teaching approaches.
- Organizational changes in the school such as new management techniques or the adoption of new curriculums.

In addition to the value of classifying innovative projects as varying along each of the dimensions presented above, the factor analysis also produces for every project a series of five factor scores that allow any project in the Rand sample to be measured in terms of its particular mix of educational methods. Subsequent analysis makes use of these analytical scores. In particular, Table 4 presents a summary comparison of how these analytical

*A discussion of the statistical analysis is not included in this preliminary report.

project characteristics are distributed among the several federal programs. The average values of the factor scores suggests that the Vocational Education programs primarily deal with enrichment methods; the Right-to-Read projects rely on intensive staffing using traditional methods and behavioral modification techniques; the Bilingual projects do not involve school administrative changes but concentrate on a combination of intensive staffing, enrichment, and some classroom organization changes. Due to the extraordinary diversity of Title III projects, the factors show a heterogenous distribution for projects funded by State or Federal Title III. (Table 5 A-E presents a more detailed breakdown of the summary figures in Table 4.)

CHANGE STRATEGY

The design of innovative projects explicitly, or more usually implicitly, designates a strategy for implementing the change anticipated by its goals and educational methods. The survey instruments used in this study collected data about those various elements of change strategies identified in the literature as being effective in aiding the implementation of innovations in the school environment. In particular, the following elements were measured:

- o planning
- o staff training
- o project meetings
- o actor participation
- o support by principle actors
- o implementation flexibility
- o incentives offered teachers
- o amount of change or effort required of teachers
- o selection of schools and teachers

During the course of the analysis, each of the above elements will be examined to determine its influence upon project outcomes. For example, statistically contolling for other relevant variables, we will estimate the extent to which planning affected the implementation and the perceived success of projects. To give the reader a more detailed impression of how the various elements of change strategy were measured, the following list catalogues some of the operational items to be used in the analysis:

Table 2

EDUCATIONAL METHODS OF PROJECTS

Special projects can call for a variety of different techniques. Please tell me which of the techniques on this card the project makes use of. CODE ALL MENTIONED.	Mentioned
Needs assessment	224
Para-professional staff (teacher aides, etc.)	188
Instructional specialists	180
Counseling and guidance specialists	90
Performance incentives for students	100
Educational technology (audio-visual materials, computers, etc.)	186
Development of new curriculum or materials	225
Adoption of new curriculum	113
Field trips	141
Open classrooms	88
Non-graded or ungraded classrooms	81
Learning centers	169
Peer instructions	130
Team teaching	148
Individualized instruction	234
Behavioral objectives	216
Diagnostic and prescriptive methods	181
New management techniques (decision-assisting technology like PPBS, MBO, etc.)	81
Parent involvement	201
Use of community resources	185

Total Sample = 289

Table 3

FACTOR ANALYSIS OF EDUCATIONAL METHODS

Variable Name	Rotated Factor Loadings					Communality
	Behavior Modification	Enrichment	Classroom Organization	Intensive Staffed Traditional Classroom	School Organization Changes	
Needs assessment	-0.102	-0.023	-0.221	-0.511	-0.412	0.491
Para-professional staff	0.218	-0.000	-0.324	-0.575	0.096	0.492
Instructional specialists	0.387	0.121	-0.114	-0.436	-0.110	0.379
Counseling and guidance specialists	0.013	0.264	0.139	-0.550	-0.019	0.392
Performance incentives for students	0.643	0.008	-0.201	0.033	0.024	0.456
Educational technology	0.726	0.121	0.071	-0.104	-0.109	0.570
Development of new curriculum on materials	0.430	0.436	-0.132	0.042	-0.321	0.497
Adoption of new curriculum	-0.020	0.358	-0.177	-0.125	-0.543	0.470
Field trips	0.088	0.758	-0.112	-0.260	0.038	0.665
Open classrooms	-0.049	0.282	-0.665	0.159	-0.238	0.606
Non-graded or upgraded classrooms	0.046	-0.170	-0.672	-0.147	-0.002	0.504
Learning centers	0.446	0.070	-0.310	-0.260	-0.185	0.402
Peer instructions	0.162	0.217	-0.472	-0.100	-0.146	0.327
Team teaching	0.085	0.213	-0.618	-0.226	-0.062	0.489
Individualized instruction	0.399	-0.173	-0.575	-0.112	-0.097	0.541
Behavioral objectives	0.322	-0.036	0.054	-0.217	-0.666	0.599
Diagnostic and prescriptive methods	0.244	-0.507	-0.227	-0.463	-0.310	0.678
New management techniques	0.063	-0.073	-0.151	0.061	-0.650	0.458
Parent involvement	0.020	0.343	-0.194	-0.616	-0.101	0.545
Use of community resources	0.159	0.727	-0.085	-0.257	-0.048	0.629
Sum Squares	1.931	2.138	2.339	2.080	1.703	10.191

Table 4

DISTRIBUTION OF EDUCATIONAL METHODS ACROSS FEDERAL PROGRAMS

Federal Programs	Mean Values of Factor Scores				
	Behavior Modification	Enrichment	Classroom Organization	Intensive Staffed Traditional Classroom	School Organization Changes
State Title III	-.104	-.105	-.103	-.180	-.012
Federal Title III	-.017	-.151	.078	-.052	.275
Right-to-Read	.201	-.568	.291	.494	.041
Bilingual	.212	.493	.317	.531	-.013
Federal Vocational Education	.426	1.035	-.302	.091	-.242
State Vocational Education	-.167	.715	-.531	-.280	-.410

Table 5A

BEHAVIOR MODIFICATION AND FEDERAL PROGRAMS

Federal Program	Mean	SD	N	Variance
	0.000	1.000	289	1.000
CLASS-S-TTL3	-0.104	1.007	102	1.014
ADMIN-S-TTL3†	0.024	1.088	11	1.183
FEDERAL TTL3	-0.017	0.938	18	0.880
RGHT TO READ	0.201	1.109	32	1.230
BILINGUAL	0.212	0.811	41	0.657
FED ADMN VEA	0.426	0.756	10	0.572
STA ADMN VEA	-0.167	1.055	15	1.113

ANALYSIS OF VARIANCE TABLE

	MEAN SQUARE	DF	F-TEST	SIGNIFICANCE	ETA
AMONG GROUPS	1.191	6	1.191	.311	0.025
WITHIN GROUPS	1.000	282			

†Administrative State Title III was a Rand classification used for sampling purposes. It will not be carried through in subsequent analysis.

Table 5B

ENRICHMENT AND FEDERAL PROGRAMS

Federal Program	Mean	SD	N	Variance
	0.000	1.000	289	1.000
CLASS-S-TTL3 †	-0.105	1.021	162	1.042
ADMIN-S-TTL3	-0.300	0.846	11	0.716
FEDERAL TTL3	-0.151	1.186	18	1.407
RGHT TO READ	-0.568	0.777	32	0.604
BILINGUAL	0.493	0.483	41	0.233
FED ADMN VEA	1.035	0.496	10	0.246
STA ADMN VEA	0.715	0.960	15	0.922

ANALYSIS OF VARIANCE TABLE

	MEAN SQUARE	DF	F-TEST	SIGNIFICANCE	ETA
AMONG GROUPS	0.977	6	7.961***	UNDER .001	0.145
WITHIN GROUPS	0.876	282			

† Administrative State Title III was a Rand classification used for sampling purposes. It will not be carried through in subsequent analysis.

Table 5C

CLASSROOM ORGANIZATION AND FEDERAL PROGRAMS

Federal Program	Mean	SD	N	Variance
	0.000	1.000	289	1.000
CLASS-S-TTL3	-0.103	1.024	162	1.048
ADMIN-S-TTL3†	0.358	1.132	11	1.281
FEDERAL TTL3	0.078	0.921	18	0.849
RGHT TO READ	0.291	0.854	32	0.729
BILINGUAL	0.317	0.784	41	0.615
FED ADMN VEA	-0.302	1.259	10	1.586
STA ADMN VEA	-0.531	0.826	15	0.683

ANALYSIS OF VARIANCE TABLE

	MEAN SQUARE	DF	F-TEST	SIGNIFICANCE	ETA
AMONG GROUPS	2.537	6	2.614*	.018	0.053
WITHIN GROUPS	0.971	282			

†Administrative State Title III was a Rand classification used for sampling purposes. It will not be carried through in subsequent analysis.

Table 5D

INTENSIVELY STAFFED/TRADITIONAL METHODS AND FEDERAL PROGRAMS

Federal Program	Mean	SD	N	Variance
	0.000	1.000	289	1.000
CLASS-S-TTL3	-0.180	1.033	162	1.066
ADMIN-S-TTL3†	-0.374	1.063	11	1.129
FEDERAL TTL3	-0.052	0.787	18	0.619
RGHT TO READ	0.494	0.751	32	0.564
BILINGUAL	0.531	0.713	41	0.508
FED ADMN VEA	0.091	1.074	10	1.153
STA ADMN VEA	-0.280	0.994	15	0.987

ANALYSIS OF VARIANCE TABLE

	MEAN SQUARE	DF	F-TEST	SIGNIFICANCE	ETA
AMONG GROUPS	4.583	6	4.942***	UNDER .001	0.095
WITHIN GROUPS	0.927	282			

†Administrative State Title III was a Rand classification used for sampling purposes. It will not be carried through in subsequent analysis.

Table 5E

SCHOOL ORGANIZATION CHANGES AND FEDERAL PROGRAMS

Federal Program	Mean	SD	N	Variance
	0.000	1.000	289	1.000
CLASS-S-TTL3	-0.012	1.000	162	1.001
ADMIN-S-TTL3†	0.428	1.027	11	1.054
FEDERAL TTL3	0.270	1.079	18	1.164
RGHT TO READ	0.041	0.905	32	0.819
BILINGUAL	-0.013	0.980	41	0.960
FED ADMN VEA	-0.242	0.837	10	0.701
STA ADMN VEA	-0.410	1.007	15	1.013

ANALYSIS OF VARIANCE TABLE

	MEAN SQUARE	DF	F-TEST	SIGNIFICANCE	ETA
AMONG GROUPS	1.095	6	1.093	.367	0.023
WITHIN GROUPS	1.002	282			

†Administrative State Title III was a Rand classification used for sampling purposes. It will not be carried through in subsequent analysis.

Planning - Number of months spent in planning and writing the original application; percent of project's first year budget spent in planning and project design; whether the methods or materials of the project were developed at site or elsewhere.

Staff training - Percent of the project budget allocated to training; the proportion of the teachers on a project receiving training; the amount of time participating teachers spent in training.

Project meetings - The frequency with which principals meet with project staff; the frequency of project meetings; the teacher's assessment of the value of the meetings.

Actor participation - The extent to which teachers and principals participated in various project decisions.

Support by principle actors - The extent to which project directors received support from the superintendent, the federal program manager, principals, faculty, and funding agency personnel.

Implementation flexibility - The extent to which teachers, principals, and project directors had freedom to alter project design characteristics during implementation.

Incentives offered teachers - Whether teachers received extra pay for training.

Amount of change or effort required of teachers.

Selection of schools and teachers - How schools were chosen; how teachers were chosen; the proportion of teachers at school involved in a project.

RESOURCES AND FEDERAL PROGRAMS

The third element characterizing the projects is resources. Of course, the resources received by the projects under consideration in this study depend upon federal programs and their policies. This section briefly describes the projects in the Rand sample in terms of resources and federal programs.

Information describing the sampled projects can be grouped into three classifications: policy data, methods data, and individual-project-history data. The amount of resources applied to a project is related to these classifications, as will be shown.

Policy data are information on the explicit goal selected by authoritative decision-makers at all levels for projects. It includes information on the particular federal grant-in-aid program which provides funding for each project, and the primary policy focus selected by each LEA for its project. Some federal program--Right-

to-Read, Bilingual (Title VII), Federal- and State-Administered Vocational Education--are explicit in their policy focus. Title III programs are diverse in focus, but some state and federal policy-makers have suggested or required applicant LEA's to focus on one or more areas. For example, the Office of Education established seven program priorities for its Section 306, Title III program. Potential applicants were encouraged to submit proposals within these suggested "areas of national concern":

> early childhood education,
> environmental education,
> education of the disadvantaged,
> reading,
> drug abuse education,
> human diversity and cultural pluralism, and
> student and youth activism.

This list of priorities was intended by the Office of Education to guide and encourage local decision-makers, rather than to describe a universe of acceptable project types. In fact, projects were even more diverse than the guidelines suggest: the priorities were modified (or at least increased in number) in the second year of the Section 306, Title III program; the applications received for the "human diversity" and "student activism" categories were very small in number; and applications were received--and subsequently funded--which were associated with none of the "priority" areas. Moreover, the categories are of little use for describing the projects. It appears that descriptively grouping the innovative projects by the USOE policy categories (which were intended to focus those projects in particular areas) is highly vulnerable to problems of likely variation within categories, instances of virtually empty categories, non-comparability of the categorization across several years of different policies, and lack of comparability with categories used for other federal programs.

Another problem with descriptive data based on policies used by program decision-makers is illustrated by the state Title III guidelines used by the California SEA. Applying LEAs were required to

use Title III funds strictly for the development or improvement of reading and mathematics programs. That is, any application submitted for California's state Title III funds had to show its relevance to the goal of improving reading or mathematics performance by students. While it may be reasonable for us to ask project directors whether their project focuses on reading, mathematics, or other student needs, the California constraint may have the effect of causing projects which focus on "attitude change" or "environmental education" or "cultural pluralism" or "dropout prevention" *to be described as reading projects*--therefore, using a simple reading/math classification question for California projects could yield misleading results.

Another sort of policy information about Change Agent projects might be the declared goal of the project. So long as project goals are either set by LEAs *or* by federal guidelines, we may obtain an idea of the aim of each project. Several federal programs have funding guidelines which are quite restrictive of project goals:

Title VII, ESEA	36 projects in sample
Right-to-Read	32 projects in sample
Vocational Education, Part D (State administered)	15 projects in sample
Vocational Education, Part D (Federally administered)	9 projects in sample

For these federal programs, it seems reasonable to assume that there is comparatively little internal variation in program goals.* For the more varied state Title III and Section 306 programs, project directors were asked "to pick one primary focus of the project," and responded as follows:

Title III Primary Focus	Projects in Sample
Bilingual Education	6
Career Education	8

*Although half the federal Vocational Education programs were made part of Model Cities projects, and "mutated" as a result.

Individualized or diagnostic/prescriptive reading curriculum	39
Individualized or diagnostic/prescriptive curriculum other than reading	26
Classroom organization changes	27
Enrichment classes or activities	9
Improving district planning or management practices	10
Something not listed	66

Comparing the federal grant-in-aid programs and the focus of Title III projects, we obtain a description of the Change Agent sample of projects which shows the diversity of goals found in the sample. [See Table 6.] Note that there are sampled Title III programs which correspond (in focus) to sampled programs funded by federal and state Vocational Education grants, Right-to-Read grants, and Title VII grants. This correspondence may make it possible to analyze the impact of different federal program guidelines on the outcome of innovative projects. A major lesson which we take from a review of the policy data is that a fixed level of resources will have different effects when applied in different policy areas.

Methods data include information on the selected *approaches* adopted by LEAs for solving their special educational problems. The particular method or technique applied by LEAs--whether it is the creation of learning centers, or staff development in the use of behavioral objectives, or the planning of a new curriculum need not be directly related to the policy focus of the project. For example, staff development could be the primary method used in bilingual, career education, or reading improvement projects.*

Indirect information on some aspects of the projects' methods can be obtained from project-specific data on the targets of the

*A major problem with the analysis of this sort of methods data is that educational-change projects frequently combine several methods. If projects are to be properly characterized, it would be desirable to identify underlying dimensions of methods rather than the simple presence or absence of a given method. But since the underlying dimensions of methods may not be known to project directors, considerable analysis must be used to develop them. The earlier section of educational methods illustrates an analytical means for characterizing projects.

Table 6

FEDERAL PROGRAMS AND THE FOCUS OF PROJECTS (N = 283)

Title III (N = 191; Federal N = 18; State N = 173)

Career Education	Individualized Reading Curriculum	Individualized Non-Reading Curriculum	Classroom Organization	Enrichment Classes or Activities	Planning or Management	Bilingual	Other
8	39	26	27	9	10	6	66
State Vocational Education	Right-to-Read					Bilingual Title VII	
15	32					36	
Federal Vocational Education							
9							

innovation. The types of schools (elementary, high school, and so forth) and number of students served by the project can be used to understand the level, extent, and concentration of the Change Agent projects.

Many projects serve more than one type of school. For example, of the 104 sampled projects serving high schools, 65 also serve elementary schools. We can categorize some of the combinations of types of schools served by Change Agent projects:

Types of Schools Served	Number of Projects
Both elementary and high schools, or both elementary and junior high	97
Elementary schools, but no high schools and no junior highs and no out-of-school or adult programs	106
High schools and/or junior highs, but no elementary schools or pre-schools	57
Other combinations of school types, including, e.g., exclusively non-public or exclusively out-of-school and adult programs	18

Management practices, staff characteristics, the amount of flexibility required in dealing with individual student problems, and the kinds of expertise relevant to the process of innovation may be expected to vary across these types of schools. It seems likely that LEA staff responsible for implementation of new projects are quite aware of the kind of school they are dealing with, and that they act on this knowledge.

A second bit of indirect evidence on the project's likely type of approach to innovation is the number of students it serves. The range of target group sizes for Change Agent projects is large: from fewer than 50 to more than 5,000 students may benefit from a single project. The frequency distribution of the size of projects in the Rand sample is given in Figure 2. A good deal of the variation in project size is associated with school district size (that is, with total enrollment), and consequently with urbanness. But there are

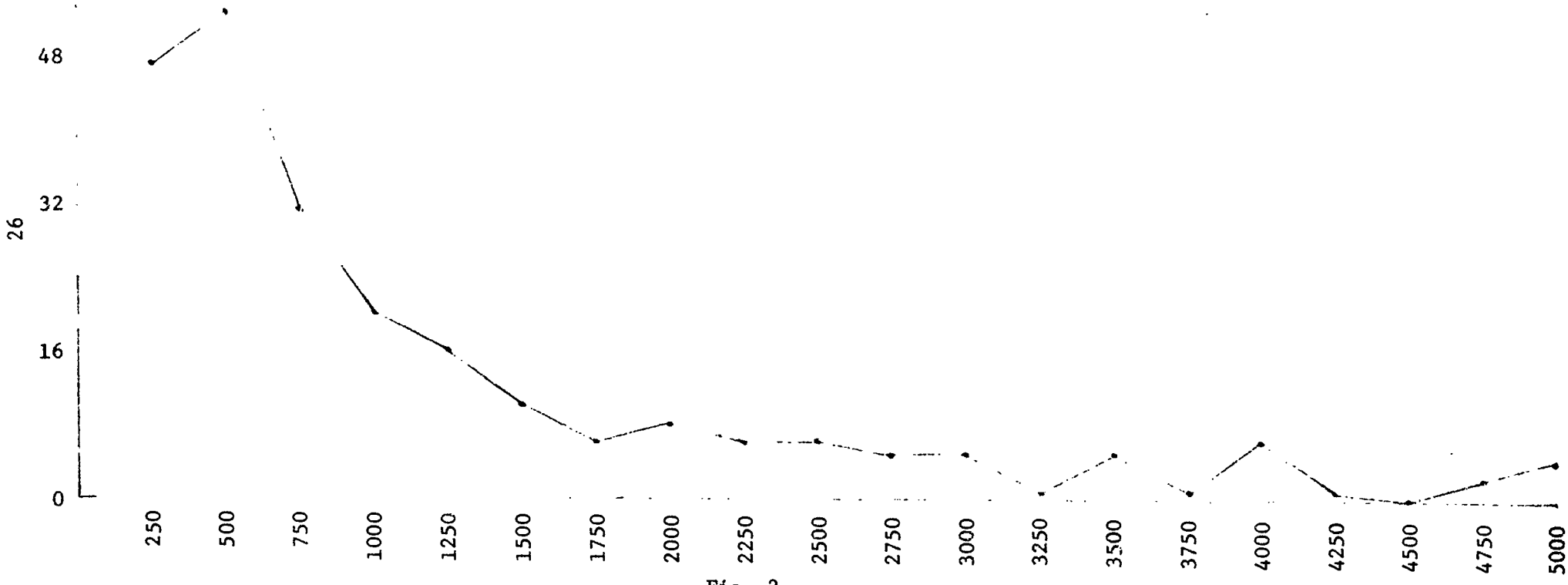

Fig. 2

SIZE OF TARGET GROUP

(29 projects from 5,000 to 50,000 not shown)

small projects even in cities, and a wide variety of policy goals have been attempted for projects having many different sizes.

Individual-project-history information refers to data describing the administrative decisions made in the course of introducing and implementing the project. Two such kinds of information are the year in which each project was initially funded, and the level of funding which it achieved. The year of initial project funding reflects at least two major facts about the project's history--the external circumstances (including federal and state policies) at the time the project was designed and implemented, and the amount of elapsed time from the project's initiation to the time of data collection (1974).

Though the sample of Change Agent projects does not allow us to infer population characteristics for all school districts receiving federal grants, it seems that the six federal grant-in-aid programs have had different histories. Table 7 gives the distribution of sampled projects by federal program and year of first funding. While most projects have been in existence for two, three, or four years, no Right-to-Read projects could have been begun before 1971, and other programs also have "lumpy" distributions for historical reasons. (The bulk of Section 306 projects were begun in 1971, and new funds were appropriated at much smaller levels after that year.)

Table 7 also enables us to see that 47 projects had been in existence four or more years when the data were collected, 112 had been in existence three years; and 110 had been in existence one or two years. Analyzing the distribution of Title VII (Bilingual) projects across years, for example, may allow us to judge whether different problems of implementation, or perhaps different perceptions of success, apply to projects with different lengths of implementation time. That is, both reported *events* which affect the project, and *outcomes* of the project, may depend on how long it has been in place in a school system.

While federal grants-in-aid are generally designed to bear the greatest share of the increased costs associated with innovative school programs, they are not the only source of funds for innovation. Many Change Agent projects obtained substantial funds *in*

Table 7

FEDERAL PROGRAM BY INITIAL YEAR FUNDED

	1968	1969	1970	1971	1972	1973	Total
State Title III	0.6 (1)	1.2 (2)	7.4 (12)	47.5 (77)	38.9 (63)	4.3 (7)	60.2 (162)
Federal Title III	---	---	5.6 (1)	88.9 (16)	5.6 (1)	---	6.7 (18)
Right-to-Read	---	---	---	25.0 (8)	71.9 (23)	3.1 (1)	11.9 (32)
Bilingual	---	32.4 (11)	20.6 (7)	11.8 (4)	32.4 (11)	2.9 (1)	12.6 (34)
Federal Vocational Education	---	---	77.8 (7)	22.2 (2)	---	---	3.3 (9)
State Vocational Education	---	14.3 (2)	28.6 (4)	35.7 (5)	21.4 (3)	---	5.2 (14)
Percent Total	0.4 (1)	5.6 (15)	11.5 (31)	41.6 (112)	37.5 (101)	3.3 (9)	100.0 (269)

(Entries are percent of row totals.)

addition to their main federal grant, from state categorical programs, special LEA appropriations, or foundations; also, some LEAs have "packaged" federal grants from such sources as Title I, EPDA, or NDEA to supplement the primary Change Agent grant. For our evaluation of the effect of extra *resources* on project outcomes, we should use information on the sum of special grants from all sources which support the innovative project. But to analyze the "policy-level" effect of the size of federal Change Agent allocations, we should depend only on the main grant.

The problem of which grant total to analyze is made more complex by the fact that most projects have had considerable variability in funding over the several years they have existed. What is the best summary of the "fiscal scope" of a project which received $40,000 in its first year, including a $10,000 planning grant; $125,000 in its second year; and $75,000 in its third year? Clearly the *variability* and *direction of trend* in funding can be used as indicators of particular federal or SEA policies on planning, project development, and encouraging continuation. For our purposes of describing the scope of the projects, however, even the average grant received over several years is somewhat deceptive, because of year-to-year variation; for example, a project primarily concerned with introducing new technology and hardware to a school may have a large capital grant in one year, and much smaller support and maintenance grants in other years. A useful summary of a project's funding which focuses on the resource requirements of the project *at its peak* is the value of total of special project grants in the year of greatest expenditure. The frequency distribution of this measure of project funding is shown in Figure 3. While quite a few Change Agent projects depended on federal grants which in any one year never exceeded $75,000 (about 90 of them), most projects had at least $100,000 in grant funds available for implementing an innovative project. The distribution of total grant packages is highly skewed--that is, there are many projects whose size is less than $150,000, and there is a slow, steady falling-off of project frequencies as the grants grow very large.

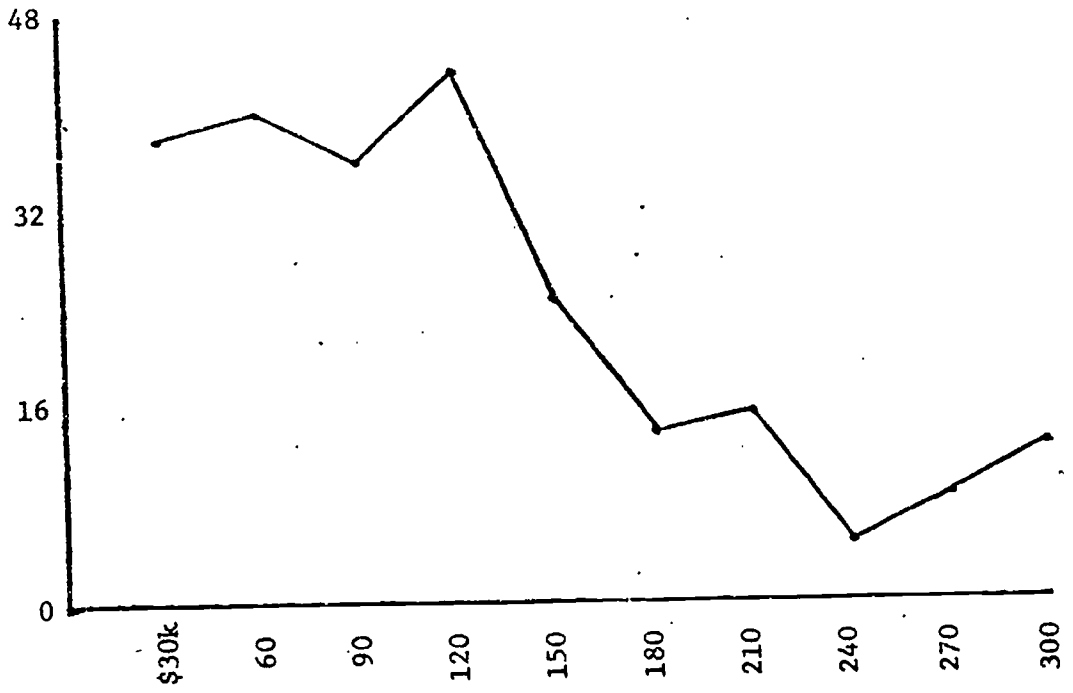

Fig. 3

TOTAL GRANT FUNDING (BIGGEST YEAR)~ Thds.

(28 projects over $300,000 not shown)

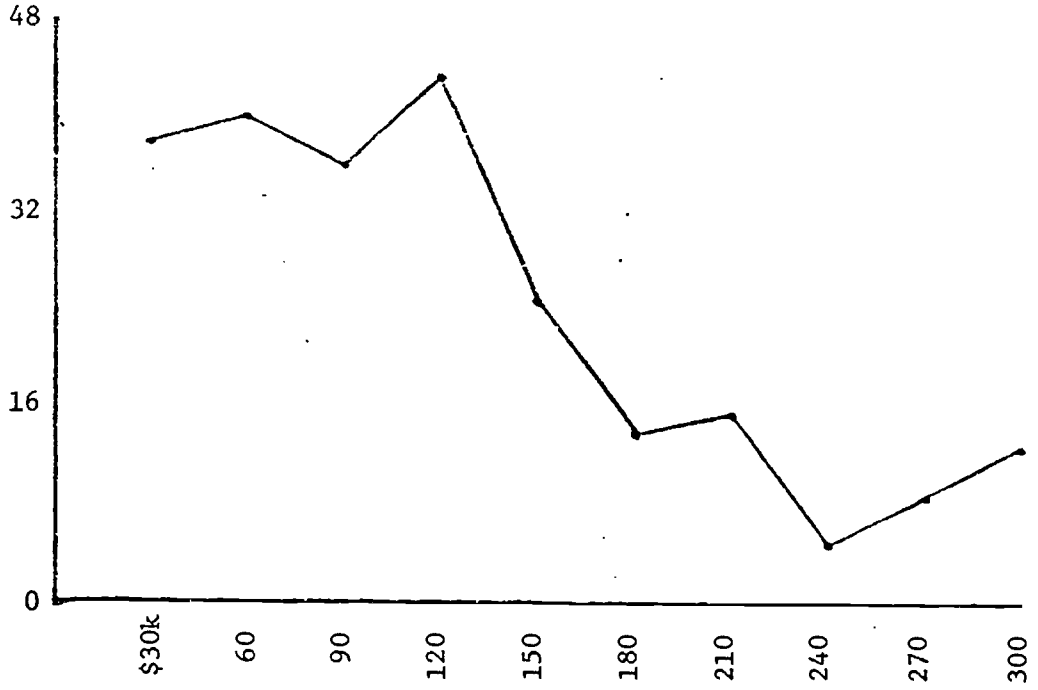

Fig. 3

TOTAL GRANT FUNDING (BIGGEST YEAR) ~ $ Thds.

(28 projects over $300,000 not shown)

By combining our information on the size of Change Agent grants and on the number of students served by the projects, we can derive a measure of the *concentration* of innovation resources. The project grant per pupil in the target group (in the project's biggest funding year) can be taken to indicate several phenomena:

- o the expense per pupil of introducing and maintaining a project,
- o the degree of focus on particular students (or dispersion among students) in a project, or
- o the policy intentions and priorities of the funding source.

Table 8 shows the pattern of concentrating resources for each of the federal grant-in-aid programs. Only the state Title III program has enough observations to permit good comparisons, but we may note that it supports more projects which spend less than $25 per student (24.8 percent of State Title III projects than do the other federal programs (11.9 percent of the five other program projects). Still, almost a fifth of the projects spend more than $450 per target student. There is clearly variation in the concentration of resources for innovation; like the other individual-project-history items, this variable may or may not have a real effect on project outcomes. Still, these measures are so commonly used that they give us a sense of what the projects, taken together, are like.

To further clarify the relationships between the concentration of resources, federal programs, and types of projects, we examined the level of federal funding received by a project as a function of the size of the number of students being served by the project and the type of project it was. Tables 9A-D present relevant regressions. For Right-to-Read, the more students there are, the higher the funding as is to be expected from the funding formula for Right-to-Read; for Bilingual the effect is also present. However, for the Title III programs, the size of the grant depends only slightly on target group size even when the type of project is controlled.

In addition to the question of funding from the federal program of concern to the Rand study, an analysis parallel to the one

Table 8

FEDERAL PROGRAM BY GRANT PER PUPIL

	Under $25	$25-$64	$65-$200	$200-$450	Over $450	Total
State Title III	24.8 (38)	19.0 (29)	24.8 (38)	17.6 (27)	13.7 (21)	60.2 (153)
Federal Title III	29.4 (5)	17.6 (3)	23.5 (4)	23.5 (4)	5.9 (1)	6.7 (17)
Right-to-Read	---	31.0 (9)	44.8 (13)	13.8 (4)	10.3 (3)	11.4 (29)
Bilingual	---	5.9 (2)	2.9 (1)	35.3 (12)	55.9 (19)	13.4 (34)
Federal Vocational Education	25.0 (2)	37.5 (3)	12.5 (1)	25.0 (2)	---	3.1 (8)
State Vocational Education	38.5 (5)	38.5 (5)	15.4 (2)	---	7.7 (1)	5.1 (13)
Percent Total	19.7 (50)	20.1 (51)	23.2 (59)	19.3 (49)	17.7 (45)	100.0 (254)

(Entries are percent of row totals.)

Table 9A

REGRESSION OF FUNDING FROM STATE TITLE III (BIGGEST YEAR)

VARIABLE	COEFFICIENT	STD.-ERROR	T(142)	P-VALUE	PARTIAL-R
STUDENTS	0.79729E-04	0.9082E-04	0.878	0.381489	0.07347
BMOD	0.90392	0.5662	1.596	0.112635	0.13278
ENRICH	0.72374	0.5808	1.246	0.214811	0.10400
CLSSORG	-0.79377	0.5578	-1.423	0.156906	-0.11858
STFTRAC	-1.4918	0.5702	-2.616	0.009853	-0.21444
ADMIN	-0.43022	0.5845	-0.736	0.462912	-0.06165

INTERCEPT= 9.919 STD.-ERROR= 0.644 T-RATIO= 15.408

Degrees of Freedom = 142
Standard Error of Estimate = 7.113
Coefficient of Determination (R-SQ) = 0.0819
F(6, 142) = 2.111 P-Value = 0.055555
Corrected R-SQ = 0.0431

Table 9B

REGRESSION OF FUNDING FROM FEDERAL TITLE III (BIGGEST YEAR)

VARIABLE	COEFFICIENT	STD.-ERROR	T(11)	P-VALUE	PARTIAL-R
STUDENTS	0.14142E-03	0.6605E-04	2.141	0.055519	0.54233
BM.O	1.2178	2.430	0.501	0.626197	0.14938
ENRICH	-2.2572	1.752	-1.288	0.224179	-0.36201
CLSSORG	-2.8433	2.375	-1.197	0.256311	-0.33958
STFTRAD	-3.5627	3.014	-1.182	0.262177	-0.33567
ADMIN	1.3450	1.576	0.854	0.411524	0.24925

INTERCEPT= 15.67 STD.-ERROR= 1.99 T-RATIO= 7.865

Degrees of Freedom = 11
Standard Error of Estimate = 7.012
Coefficient of Determination (R-SQ) = 0.5450
F(6, 11) = 2.196 P-Value = 0.122392
Corrected R-SQ = 0.2969

Table 9C

REGRESSION OF FUNDING FROM BILINGUAL PROJECTS (BIGGEST YEAR)

VARIABLE	COEFFICIENT	STD.-ERROR	T(33)	P-VALUE	PARTIAL-R
STUDENTS	0.10728E-01	0.2252E-02	4.764	0.000037	0.63835

INTERCEPT= 10.15 STD.-ERROR= 2.34 T-RATIO= 4.335

Degrees of Freedom = 33
Standard Error of Estimate = 10.18
Coefficient of Determination (R-SQ) = 0.4075
F(1,33) = 22.695 P-Value = 0.000037
Corrected R-SQ = 0.3895

Table 9D

REGRESSION OF FUNDING FROM RIGHT-TO-READ PROJECTS (BIGGEST YEAR)

VARIABLE	COEFFICIENT	STD.-ERROR	T(27)	P-VALUE	PARTIAL-R
STUDENTS	0.39052E-02	0.4947E-03	7.893	0.000000	0.83526
INTERCEPT= 2.919	STD.-ERROR= 0.652	T-RATIO= 4.480			

Degrees of Freedom = 27
Standard Error of Estimate = 2.273
Coefficient of Determination (R-SQ) = 0.6977
F(1, 27) = 62.305 P-Value = 0.000000
Corrected R-SQ = 0.6865

sketched above was conducted for the extra funds received by a project from other federal programs, the state, local sources, or foundations. Table 10 A-C presents the results.

Table 10B

REGRESSION OF EXTRA FUNDING FOR FEDERAL TITLE III PROJECTS (BIGGEST YEAR)

VARIABLE	COEFFICIENT	STD.-ERROR	T(11)	P-VALUE	PARTIAL-R
STUDENTS	1.5036	0.8155	1.844	0.092299	0.48588
SMSA	-30445.	0.3601E 05	-1.016	0.331468	-0.29289
[illegible]	-35523.	0.2164E 05	-1.642	0.128861	-0.44364
CLASSES	-29812.	0.2932E 05	-1.017	0.331043	-0.29314
STATEAID	58153.	0.3722E 05	1.563	0.146391	0.42625
ADMIN	-9058.2	0.1945E 05	-0.496	0.629317	-0.14805

INTERCEPT= -8147. STD.-ERROR= 0.2466E 05 T-RATIO= -0.331

Degrees of Freedom = 11
Standard Error of Estimate = 0.8657E 05
Coefficient of Determination (R-SQ) = 0.6191
F(6, 11) = 2.980 P-Value = 0.055672
Corrected R-SQ = 0.4114

Table 10C

REGRESSION OF EXTRA FUNDING FOR BILINGUAL PROJECTS (BIGGEST YEAR)

VARIABLE	COEFFICIENT	STD.-ERROR	T(32)	P-VALUE	PARTIAL-R
STUDENTS	393.54	163.2	2.393	0.022770	0.38955
SSV	-0.81733E-01	0.4831E-01	-1.693	0.100142	-0.28674

INTERCEPT= -3.8533E 05 STD.-ERROR= 3.785E 05 T-RATIO= -1.082

Degrees of Freedom = 32
Standard Error of Estimate = 0.2363E 06
Coefficient of Determination (R-SQ) = 0.2183
F(2, 32) = 4.467 P-Value = 0.019456
Corrected R-SQ = 0.1694

III. INSTITUTIONAL SETTING

Many elements of institutional setting will be considered in the analysis. For example, teacher, principal, and project director personal characteristics and such school characteristics as size, percentage of Title I students, and morale will be included in the analysis of teacher implementation outcomes. At the level of the school district, we wish to consider various LEA characteristics as a complex whole rather than isolated facts. This section deals only with the school district level and offers a preliminary analysis of a single measure that summarizes a number of critical LEA characteristics.

One of the strongest impressions gleaned from our field experience was the importance of the overall school district to innovativeness. That is, some school districts seemed more likely to innovate and seemed more likely to produce successful innovations than other districts. The literature on educational innovation often ignores the institutional setting and those studies that do analyze organizational aspects usually focus on the school but neglect the district. We believe the school district does matter; the challenge is to understand how.

The strategy for dealing with school district effects involves two stages. The first stage consists of developing an equation that predicts the propensity to innovate of a school district based upon various structural characteristics of the district. The second stage consists of using both the predicted value of innovativeness and the residual value of innovativeness (i.e., the extent to which districts "over" or "under" innovate according to their structural characteristics) in the analysis of the success of individual projects. The rationale for this two-stage strategy rests on our hypothesis that the structure of the school district affects schools, teachers, and projects as a complex whole; we summarize this by the district's propensity to innovate. The second stage will be discussed in detail in the final report. This section presents a preliminary analysis of the first stage.

MEASURING INNOVATIVENESS

Innovativeness is an elusive concept. Not only is there no agreed upon definition of innovativeness in the literature but operational measurements differ widely. We view innovation as a change process involving various stages. Different conceptions of innovation emphasize different stages in the change process. One conception deals with the invention of new techniques, strategies, or arrangements. The *invention* of educational strategies, methods, or technology is not the focus of this study. Rather we are concerned with the change processes initiated by the *adoption* of projects or programs that are new relative to the adopting school district (or units within the school district). Alternative definitions of innovation focus on two other aspects of change processes. First, the successful *implementation* of a project or program that is new relative to the district. Second, innovation may also be taken to mean that the introduction of a project or program produces a presumably improved *outcome*. Implementation and outcomes will be treated in Volumes II and III but, for reasons to be elaborated, the adoption definition is the one employed in this section.

School districts differ widely in their propensity to (and the rate at which they) adopt projects or programs new relative to their current practices. Without begging the question of the extent to which the adoption of a new program implies either its full implementation or significant outcomes, we shall operationally measure the propensity of school districts to adopt "innovations" by summing up the number of widely discussed educational innovations tried by the district in the last decade.

Table 11 presents a list of 21 "educational innovations."* Each superintendent of the school districts in our sample (n = 194) was

*Superintendents were also asked about the adoption of bilingual programs. However, since such programs are only adopted in LEA's having significant non-English speaking pupils, they are dissimilar from other educational innovations on the list used, hence, were deleted.

Table 11

Superintendent's Responses to List of Innovations in the School District

Question: Here is a list of educational innovations which have been tried out in some school districts in the last decade. For each innovation, please circle the appropriate code to indicate whether it was never tried, tried but not incorporated, or has been incorporated into current practice in your district.

	Never Tried	Tried in District But Not Now Incorporated	Incorporated into Current District Practice	
Programmed learning	19.21	28.25	52.54	NA-17*
Extended school year	72.88	3.38	23.72	NA-17
Extended field trips	17.77	10.55	71.66	NA-14
Team teaching	5.11	5.68	89.20	NA-18
Non-graded or ungraded classrooms	15.08	10.05	74.86	NA-15
Flexible scheduling	20.00	15.42	64.57	NA-19
PSSC (Physical Sciences Study Committee) Physics	29.82	14.03	56.14	NA-23
Typing in elementary	57.71	18.85	23.42	NA-19
Community school	54.71	7.65	37.65	NA-24
Work/Study program	9.09	3.41	87.50	NA-18
Teacher Corps	71.67	8.67	19.65	NA-21
Student exchange	30.81	18.60	50.58	NA-22
Educational T.V.	13.55	15.25	71.18	NA-17
Simulation or gaming	26.90	19.29	53.80	NA-23
Individualized instruction (Method and/or Materials)	.56	5.08	94.35	NA-17
Open classrooms	23.03	8.43	68.54	NA-16
Program budgeting (PPBS [Planning program and budgeting system])	52.80	13.48	33.70	NA-16
Behavioral objectives	7.91	14.12	77.97	NA-17
Alternative school	46.86	7.43	45.71	NA-19
Special classes for gifted	22.15	17.04	60.79	NA-18
Needs assessment	10.11	15.17	74.72	NA-16

*NA - number of superintendents not answering.

asked to indicate for each innovation whether the school district had tried the new program and whether the program was currently incorporated into district practice. Some of these educational innovations--e.g., extended school year--if fully implemented would require extensive changes in the administrative life of a school district; others, such as the introduction of educational television, imply fewer organizational changes. The frequencies of responses shown by Table 11 indicates that such practices as team teaching, work/study program, and individualized instruction have been generally adopted by the districts in this sample whereas other practices such as extended school year, teacher corps, and program budgeting (PPBS) have not been as widely adopted.* The question this section asks is what aspects of the characteristics of school districts (and how they vary) explain the differences in their propensity to adopt innovations of the type indicated in the above list.

The analysis could proceed by considering each innovation separately as a function of theoretically plausible characteristics of the district and then comparing the results for each innovation. Since that procedure would be costly and might tend to be dominated by the specific substance of the list of educational innovations used here, we approach the measurement of the dependent variable by aggregating the individual measures. In particular, we employed the following five scales:

(1) An unweighted sum of the responses to all the educational innovations where a zero score was given if the district had not tried the innovation and a score of one otherwise.
(2) An unweighted sum of the responses to those innovations that primarily involve the student in this classroom and do not

*The responses to whether the programs were "tried in the district but not now incorporated" are ambiguous because a yes response could indicate either that the project was tried and rejected or is being tried and has not yet been incorporated. To avoid errors due to this ambiguity the analysis categorizes the responses for each innovation into either never tried or tried.

imply major administrative changes in the school or school district organization.*

(3) An unweighted sum of the responses to those innovations that imply administrative or organizational changes in the school or school district.**

(4) A weighted sum of the responses to those innovations that imply administrative or organizational changes in the school or school district.***

(5) A weighted sum of the responses to all innovations using the weights of scale four.

The point of using these alternative scaling procedures is to explore several problems of validity in the construction of an innovation index. First of all, the summing of the various items tends to mask overly strong effects of the specific substance of each item. However, such aggregation necessarily makes the index abstract and thus should be interpreted as the propensity to adopt current educational innovations. Secondly, since the aggregation of all items might lose "too much" of the substance of the innovations, scales two and three separate the student-class oriented innovations not implying administative changes from those innovations that involve administrative alterations. Thirdly, the various innovations undoubtedly differ in the ease with which they might be adopted; an equal weighting scheme assumes away these differences. Scales four and five represent a preliminary effort to weight the innovations and thus enable us to examine the

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*The items included are programmed learning, extended field trips, PSSC physics, student exchange, educational TV, simulation or gaming, individualized instruction, and special classes for gifted.

**The items included are extended school year, team teaching, non-graded or ungraded classrooms, flexible scheduling, community school, work/study program, teacher corps, open classrooms, PPBS, behavioral objectives, alternative schools, and needs assessment.

***The following weights were used: three for alternative school; two for each of open classroom, non-graded or ungraded classrooms, and team teaching; and one for the remaining administrative items.

sensitivity of the results to an equal weighting assumtion. Table 12 presents the statistical characteristics of the five innovativeness scales.

EXPLAINING SCHOOL DISTRICT INNOVATIVENESS

In "explaining" innovativeness in this section, we will not deal directly with internal processes or decisions within the school districts. Rather we will try to explain the differences in the propensity to adopt innovations in terms of theoretically plausible characteristics of the district. Considerable empirical literature about the diffusion of innovation, particularly in the fields of agriculture, medicine, public bureaucracies, and economic firms suggests that size, wealth, and the availability of resources are related to the propensity of organizations to adopt innovations.* That is, larger and wealthier organizations often appear to adopt more innovations. This finding may seem contrary to one's intuition about the "conservative" nature of large organizations and perhaps even more counter-intuitive for school districts. Nonetheless, as the following analysis shows factors related to size and wealth strongly affect school district innovativeness.

Table 13 presents the results of a statistical analysis of the school district's propensity to adopt innovations considered as determined by a variety of characteristics of the district. In particular, using ordinary least squares estimation procedures, the independent variables used to explain the variation in school district innovativeness represent five groups of factors that, on a priori grounds, might affect innovativeness. The first group consists of two measures of size--total LEA enrollment and number of students per school; the second group consists of four measures of the district's financial situation--the expenditure per pupil of the district measured in terms of the district's deviation from the state's average, the average expenditure per pupil of school districts in the district's state, the general financial situation of the district as assessed by the superintendent, and whether the district (according to the superintendent) has been forced to cut back on programs due to

*This preliminary Working Note generally omits specific references to the literature.

Table 12

STATISTICAL CHARACTERISTICS OF INNOVATIVENESS SCALES

Scale	Mean	Median	St. Dev.	Range
Sum of All Innovations Unwt.	13.9	13.9	3.5	0-20
Sum of Student-Class Innov.	6.8	7.1	1.8	0-9
Sum of Administrative Innov.	7.1	7.2	2.2	0-11
Sum of Administrative Innov. Wt.	9.8	9.9	3.2	0-15
Sum of All Innovations Wt.	16.6	16.8	4.5	0-24

Table 13

SCHOOL DISTRICT INNOVATIVENESS

School District Independent Variables	REGRESSION COEFFICIENTS FOR INNOVATION INDICES (Std. Error) (Prob-Value) All	Class	Admin.	Admin. Wt.	All Wt.
(Log) District Enrollment	1.49* (.168) (.00)	.697* (.101) (.00)	.790* (.113) (.00)	1.10* (.182) (.00)	1.80* (.226) (.00)
Pupils Per School (Residual)	-1.85* (.518) (.00)	-1.03* (.312) (.00)	-.827* (.348) (.02)	-1.19* (.561) (.04)	-2.22* (.697) (.00)
Expenditures Per Pupil/State Average	.183 (.667) (.78)	-.073 (.402) (.86)	.256 (.448) (.57)	.664 (.722) (.36)	.592 (.900) (.51)
State Average Expenditure Per Pupil	-.0005 (.001) (.73)	-.0003 (.001) (.71)	-.0007 (.001) (.40)	-.0004 (.001) (.78)	-.0001 (.002) (.95)
Adequacy of District Financial Situation	.396** (.240) (.10)	.244** (.144) (.09)	.152 (.161) (.35)	.345 (.260) (.187)	.588** (.323) (.07)
Recent Cutbacks in Programs	-.890* (.416) (.03)	-.250 (.251) (.32)	-.640* (.279) (.02)	-.827** (.450) (.07)	-1.08** (.56) (.06)
Percent Revenue from State/ State Average	-120.* (48.3) (.01)	-56.3** (29.1) (.06)	-64.9* (32.4) (.05)	-65.8 (52.2) (.21)	-122.** (65.0) (.06)
State Average Percent Revenue From State	.036** (.021) (.09)	.005 (.013) (.67)	.030* (.014) (.03)	.030 (.023) (.19)	.036 (.028) (.21)
Percent Revenue From Federal/ State Average	6.60 (16.8) (.70)	3.96 (10.1) (.70)	2.64 (11.3) (.81)	16.1 (18.2) (.38)	20.0 (22.6) (.38)
State Average Percent Revenue From Federal	-.104 (.969) (.29)	-.015 (.058) (.80)	-.089 (.065) (.18)	-.057 (.105) (.59)	-.072 (.130) (.58)
Percent Families with Income $25,000	12.7* (5.55) (.02)	6.93* (3.35) (.04)	5.78 (3.73) (.12)	11.3** (6.01) (.06)	18.2* (7.47) (.02)
Percent Poor Families Predicted from Minority	-11.3* (5.11) (.03)	-8.35* (3.08) (.01)	-2.91 (3.43) (.39)	-5.30 (5.54) (.34)	-13.6* (6.88) (.05)
Rural	-.858 (.687) (.21)	-.159 (.414) (.70)	-.698 (.461) (.13)	-1.31** (.743) (.08)	-1.47 (.924) (.11)
Tenure of Superintendent	.131* (.038) (.00)	.070* (.023) (.00)	.062* (.026) (.02)	.073** (.041) (.08)	.143* (.51) (.01)
Years of Superintendent's Prior Experience in District	.031 (.024) (.21)	.020 (.015) (.18)	.011 (.016) (.51)	.019 (.026) (.48)	.038 (.033) (.24)
R^2 (Corrected)	.58	.44	.49	.41	.54
Correlation Coefficient	.79	.70	.74	.69	.76
Degrees of Freedom	134	134	134	134	134
Range of Dependent Variable	0-20	0-9	0-11	0-15	0-24

*Significant at .05

**Significant at .10

financial circumstances; the third group relates to the source of the district's revenues--the percent of the district's revenue derived from local sources measured in terms of the district's deviation from the state average, and the average percentage of revenue derived from the local sources of school district in the district's state; the fourth group consists of three measures of the socio-economic-ethnic characteristics of the community in which the school district is embedded--the percentage of families in the community with incomes over $25,000, the percentage of families in the community with incomes under the poverty level combined with the percentage of families from minority groups (black or Spanish speaking), and whether the district is in a rural area; and the final variable is the tenure of the district's current superintendent. In the course of analyzing the results, we will discuss the meaning of these variables more fully and interpret their theoretical significance.

Table 13 displays the regression coefficients from each of the independent variables along with their standard errors and probability-values. The same structural equation is used for the five measures of propensity to adopt innovations previously discussed. R^2, the proportion of the variation (adjusted for the degrees of freedom used in the estimation) explained by the independent variables is indicated below each column.

The variable with the largest effect on the propensity to adopt innovations is the size of a school district as measured by enrollment:* Controlling for other factors, it accounts for approximately 30 percent of the variance in the dependent variables. Why do larger school districts tend to adopt more innovations? One theoretically plausible explanation is that larger school districts have more

*Since the distribution of enrollment is highly skewed, a logarithmic transformation of the enrollment was employed leading to a much closer to normal distribution. The regression coefficient for log enrollment should be interpreted as there being an average increase of 1.56 innovations for every change of one in the natural logarithm.

"organizational slack" than smaller districts. Organizational slack in the context of the school district can occur in several ways. Larger school districts have larger operating budgets and perhaps a greater flexibility to direct funds within that budget. Perhaps even more importantly, size may allow political flexibility. That is, the motivation for school districts to adopt innovations are complex and mixed. For any of a variety of specific reasons, the district may feel either a positive desire or a reactive need to introduce new programs. On the other hand, district decision-makers may be risk adverse in the sense that they may be more concerned with avoiding failures than promoting change. All other things being equal, the consequences of failure of a project with the same scope in a large district would have fewer and more diffuse political repercussions than in a small district. In short, bigger districts can better afford, in political terms, to experiment than smaller districts.

Several implications follow from this size effect for the prospects of particular innovations. For a project of the same relative "scope," we would expect there to be less pressure from above in a larger district than in a smaller one. We do not have plausible theoretical reasons to suggest what the direction of the effect of such pressure on the success of a project might be; we take this question to be an empirical issue. However, it is reasonable to hypothesize that assuming equal success of an experimental project of the same relative scope, the larger district would be less likely to incorporate a project--i.e., propogate it throughout the district on a regularized basis. For the smaller district, the lack of political slack means that adoption is equivalent to the placing of one's bets. For the larger district, the availability of political slack means the adoption is experimenting; when the time comes to incorporate, the pressure is to spread the innovation throughout the district and such propagation raises severe political risks.

We have deliberately glossed over the phrase "relative scope" of a project. It is clear that a project involving the same absolute

level of resources (teachers, materials, and expenditures) has different economic consequences in a small district than in a larger district. In particular, the same project in the small district can be expected to have a larger opportunity cost than in a large district. Such opportunity costs cannot be calculated but, nonetheless, play an important role in district decisions. Moreover, identical projects may have more political visibility in a small district than in a large district.

Another dimension of district size also affects innovation. Districts having the same overall enrollment differ in the number and size of the schools within the district. To capture part of this important organizational difference among school districts, we used as an explanatory variable the enrollment density for the district--i.e., the average number of students per school in the district.* Density decreases innovation, all other things being equal. Though density's impact on innovation is about one third as great as that of enrollment, it is highly significant as Table 13 shows.

Several plausible explanations of the importance of density can be offered. Perhaps the most compelling theoretical reasons are based upon organizational slack. The more dense the district (and thus the fewer the number of schools for the same enrollment), the less slack exists both in economic and political terms.

In addition to size related characteristics, the effects of "wealth" (controlling for size and other wealth-related characteristics) can be expected to affect the propensity to adopt innovations. Measuring the wealth of a school district is an extraordinarily complex task. Not only is it difficult to conceptualize what the appropriate measures of wealth should be, but gathering the appropriate information from school officials, who cannot be expected to keep their financial records in a theoretically

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*The enrollment density increases with larger enrollment. (Overall [log] enrollment is correlated .485 with enrollment per school.) Since we are interested in the effect of density independent of enrollment, the variable used in the regression is the residual of [log] pupils per school regressed on [log] enrollment.

useful way is, at best, uncertain. As a means for coping with this situation, we used four measures. Expenditure per pupil varies considerably across individual school districts throughout the country. However, part of this variation is due to differences among the states in such areas as state policies and regional wage rates. Since our sample of school districts was picked by a first-stage state selection, we need to control the effect of state on the expenditures of school districts within the state. Therefore, the regression includes both deviation of each school from the state average expenditure per pupil and the absolute value of the state average. Neither of these variables were significantly related to innovativeness.

That the state average expenditure per pupil fails to be significant is not surprising. Much of this difference in averages among states is due to such costs as teacher salaries and operating and maintenance costs of districts rather than to the type of additional expenditures that might result in economic slack.*

The lack of significance of the relative expenditure per pupil is more surprising--at least at first thought. However, many of the reasons school districts sperd more money per pupil than other districts (in the same state) arise from dealing with problems such as compensating for children from poor or minority families. Such incremental expenditures mitigate against slack for the district. On the other hand, higher relative expenditure per pupil can reflect a greater local wealth base of the district and political pressures from the wealthier members of the community; in this case, one does expect slack and an impetus towards innovation. In short, the differences in relative expenditure per pupil arise from conflicting sources and thus cause expenditure per pupil not to be significantly

*For example, the range of the average of the salaries of the instructional staff for the highest-paying state (New York) in our sample to the lowest-paying state (Arkansas) in our sample is $11,730 to $6,715. [Ranking of the States, 1972.]

related to innovativeness when those other sources are taken into account.*

Whereas expenditure per pupil has little effect, two other direct but "noisy" measures of the financial situation do affect the propensity to adopt innovations. We asked each superintendent to indicate what the present financial situation in the district was and to indicate whether the district had been forced to cut back on programs.** Since both of these variables rely on the subjective judgment of superintendents, their validity needs to be questioned. Nonetheless, it seems reasonable to interpret the superintendent's answer to the financial situation for carrying out *needed* educational programs as a surrogate for the extent of economic slack (excess over needed funds) available in the district. In any event, the better the financial situation, the higher the propensity of districts to innovate. Half the superintendents in our sample said they had to cut back on programs due to financial shortages. The districts saying so are

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*The data support the above explanation for the lack of significance of the relative expenditure per pupil in the following way. The zero-order correlation between relative expenditure and the innovativeness scale is approximately .2 but expenditure per pupil also has a zero-order correlation of .13 with the percent of the families in the district who are black or Spanish-speaking and .19 and .12 with the percent of the families with incomes over $25,000 and the overall financial situation of the district as reported by the superintendent respectively. The analysis includes and controls for all of these variables (as well as the others indicated in Table 13) in which event expenditure has a positive but not significant effect upon innovativeness with a partial correlation under .1.

**The questions and the marginal results are the following:

How do you view the present financial situation in your district? Would you say your budget is more than adequate, adequate, barely adequate, or inadequate to carry out needed educational programs?

	%
More than adequate	*29.8*
Adequate	*26.7*
Barely adequate	*39.8*
Inadequate	*3.7*

No answers -3, n = 194.

Has your district been forced to cut back on programs in the last few years as a result of financial shortages?

Yes	*49.0*
No	*51.0*

No answers -2, n = 194.

districts on the financial margin and would be less likely to have economic slack; they were less likely to adopt innovations.

The above findings can be further clarified by examining the analysis of class-type innovations versus administrative innovations. Table 13 shows that for the subset of class-type innovations the general financial situation is significant (indeed more so than for the innovativeness scale including all innovations) whereas cutback fails to be significant. The opposite result holds for administrative-type innovations. A plausible interpretation of these results is that districts having economic slack are more likely to adopt class-student type innovations and districts operating at the financial margins are less likely to adopt administrative-type innovations.

One important implication of the above findings for particular innovative projects is clear: all other things being equal, we would expect districts having financial slack to be more likely to continue a class-student type project on its own funds after initial federal funding is completed than an administrative-type project.

The next group of variables is concerned with the source of financial support for school districts. There is considerable variability among school districts in the extent to which their revenues come from local government, the state, or from the federal government. A major aspect of this variability is related to the differences among states in terms of their wealth, their demographic characteristics, and their state policies towards the financing of education. For example, the percent of revenue for schools from state government varies in our sample from a high of 68.7 (North Carolina) to a low of 21.7 (Massachusetts). To correct for state variation, the analysis uses both the absolute value of the state average percentage and the relative deviation of the school district from its state average.

The results of the analysis shown by Table 13 indicates that differences among school districts in the percentage of federal funds they receive vis à vis revenue from state and local governments does

not significantly affect the propensity to adopt innovations. This finding is understandable when one considers the "entitlement" or grants-in-aid basis for federal funding. Of course, this result does not imply that a particular innovative project funded by the federal programs considered in this study would not work.

The differences among school districts in the percent of their revenue derived from state government does significantly affect innovativeness. The higher the percentage of revenue from the state relative to other school districts within the state, the lower the propensity to innovate. Two hypotheses may explain this result. First, incrementally more state money may be going to districts that need the funds in order to deal with their financial problems. Thus, the relative deviation of a district from the state average in the percentage of funds received from the state is negatively correlated with both the relative expenditure per pupil (-.31) and the general financial situation of the district (-.24); it is also negatively related (-.31) to a measure that in part reflects the wealth base of the community, the percentage of families with income over $25,000. Moreover, the relative percentage revenue received from the state is highly negatively correlated (-.89) with the relative percentage revenue received from the local government. Secondly, state monies may be more tied down than either local or federal funds. Both of these hypotheses work in the same direction towards reducing the amount of slack for the school district.

The next group of variables, representing demographic characteristics of the community, are importantly related to innovativeness. The percentage of families with income of at least $25,000 increases innovativeness whereas the percentage of families with income below the poverty level combined with minority decreases innovativeness. Rural decreases innovativeness as anticipated, though the result fails to be significant.

The final group of variables refer to a factor that analysts of school systems believe strongly influences the policies of the school

district--the superintendent. The tenure of a superintendent (whether measured in terms of numbers of years as superintendent or as a dummy variable for three or fewer years or more than three years) increases innovativeness. This result holds up even controlling for the mobility and the past experience of the superintendent. An hypothesis explaining this result is a political-organizational one. Innovations in school districts generally come incrementally and involve the ability of the superintendent to use the political slack in the system. More experienced superintendents better know how to manipulate their system.

Further interpretations of these preliminary findings will be deferred. Volume II of the Change Agent reports will treat school district innovativeness more extensively and will integrate the findings presented by this Working Note into the more comprehensive analysis of the school district's decision to continue innovative projects.

APPENDIX

Appendix

REPRESENTATIVENESS OF SURVEY AND FIELD WORK SAMPLES

I. INTRODUCTION

The federal government sponsors education Change Agent programs to introduce or spread innovative practices at the local school district level. Rand is attempting to identify for federal, state, and local policy-makers what characteristics of the programs themselves, the innovations they support, or the districts that adopt them lead to successful implementation and continuation. A series of hypotheses concerning innovation in public schools will be tested with data from a nation-wide survey of Change Agent projects conducted by the National Opinion Research Center of Chicago (under subcontract with Rand). This survey involves 187 school districts,* and is supplemented by in-depth field studies in 23 school districts.

This paper uses census variables to characterize the survey and field work samples being used in the Change Agent study. To test the representativeness of the samples, it compares the survey sample with the total population, and compares the field work sample with the survey sample. In addition, the Appendix briefly describes each of the field sites.

The sampling of Change Agent projects was accomplished in two stages: a sample of 18 states from the contiguous 48 followed by the selection of projects within states. The general objective of the state sample was to obtain a sample broadly representative on three dimensions: region, level of education funding, and intensity of educational management at the state level. For the selection of projects, the guiding objective was diversity of school districts--i.e., large and small districts, urban and rural, varying racial-ethnic concentrations.

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*There were 18,655 operating school districts in the U.S. in fall 1969 [4].

Several criteria were used to determine eligibility of projects for the sample. The one most likely to affect the representativeness of the sample may be the requirement that the project have a yearly funding level of at least $10,000, which would bias the sample to some degree toward larger districts. Because of the weighting criteria used in the selection of the 18 states, 6 states fell into the sample with certainty. These 6 are California, Illinois, New York, Ohio, Pennsylvania, and Texas, which as a group contain most of the largest metropolitan areas. So, we expect our survey sample to be biased to some degree toward larger school districts. More details on sampling procedure can be found in [2; pp. 30-42, 74-76].

For the field work sample, five field work teams, each focusing on one area of innovation, selected projects from 23 school districts for in-depth study in the areas of career education, bilingual education, classroom organization, staff development, and reading. The districts chosen for each of the five areas vary over organizational, financial, and political conditions, allowing observation of the effects of such variables on the particular innovation.

We discuss the census variables for the survey sample and test its representativeness in Section II. The field work sample is given a similar treatment in Section III.

II. THE SURVEY SAMPLE

Census Characteristics

We are using as our data source the 1970 Census School District Data Tape which contains the usual census-type variables organized by school districts. We will use six variables to describe the sample. These are total population of the district, public school enrollment, proportion of the population in the district that is urban, proportion that is black, and two income variables: the proportion of families with incomes in 1969 of $25,000 or more and the proportion of families below the poverty level in 1969.

From a priori considerations, we use logarithms of both total population and school enrollment. Transformations for some of the

other variables may be suggested by the statistics for the survey sample. Such transformations may be useful in the modeling of innovativeness of school districts.

All of the data analysis in this paper will treat New York City separately. All of New York City is one school district, and statistics on the data tape are all aggregated to the whole city. However, the city is divided into what are called community school districts, which operate with a certain degree of autonomy. Our survey of Change Agent projects includes 9 of the 32 community school districts, and data for these 9 community districts are not on the census tape. Data for some of the six variables we are using are available from the New York City Board of Education, and will be discussed later. But in the discussion immediately following, we are excluding New York City. Our sample, then, consists of 186 school districts.

Transformed (to natural logarithms) values will be used for population and enrollment, and untransformed proportions for the other four variables. The means for the logs of population and enrollment are 10.580 and 8.990 respectively, corresponding to population and enrollment values (i.e., exponentiating the mean logs) of about 39,000 and 8,000 respectively. Log enrollment ranges from 5.790 to 13.394, corresponding to an enrollment range of 327 to about 650,000. The log transformations for both population and enrollment produce variables that are very symmetrical and nearly normal in distribution, as indicated by the near equality of mean and median, and by the measures of skewness and kurtosis. More summary statistics for these two variables are given in Table 1, and histograms are in Tables 2 and 3.

The proportion of the population of a school district that is urban covers the complete range from 0 to 1 in our survey sample of school districts, with a mean proportion urban of .740. The median proportion urban, however, is .931, implying some skewness to the left in the distribution. As seen in the histogram in Table 4, just over 40 percent of the districts are between 98 and 100 percent urban. Still, about 15 percent of the districts are below 20 percent

FILE NAME (CREATION DATE = 06/21/74)

VARIABLE LOGPOP LOG OF SCHOOL DISTRICT POPULATION

MEAN	10.331	STD ERROR	0.111	MEDIAN	10.406
STD DEV	1.516	VARIANCE	2.297	KURTOSIS *	0.027
SKEWNESS	0.003	RANGE	7.874	MINIMUM	7.163
MAXIMUM	15.037				

VALID OBSERVATIONS = 186
MISSING OBSERVATIONS = 0 OR 0.0 PERCENT OF TOTAL

VARIABLE LOGENRL LOG OF SCHOOL DISTRICT ENROLLMENT

MEAN	8.990	STD ERROR	0.108	MEDIAN	8.855
STD DEV	1.477	VARIANCE	2.181	KURTOSIS *	0.043
SKEWNESS	0.419	RANGE	7.604	MINIMUM	5.790
MAXIMUM	13.394				

VALID OBSERVATIONS = 186
MISSING OBSERVATIONS = 0 OR 0.0 PERCENT OF TOTAL

VARIABLE PCURB PROPORTION OF POPULATION THAT IS URBAN

MEAN	0.740	STD ERROR	0.025	MEDIAN	0.931
STD DEV	0.345	VARIANCE	0.120	KURTOSIS *	0.057
SKEWNESS	-1.272	RANGE	1.000	MINIMUM	0.0
MAXIMUM	1.000				

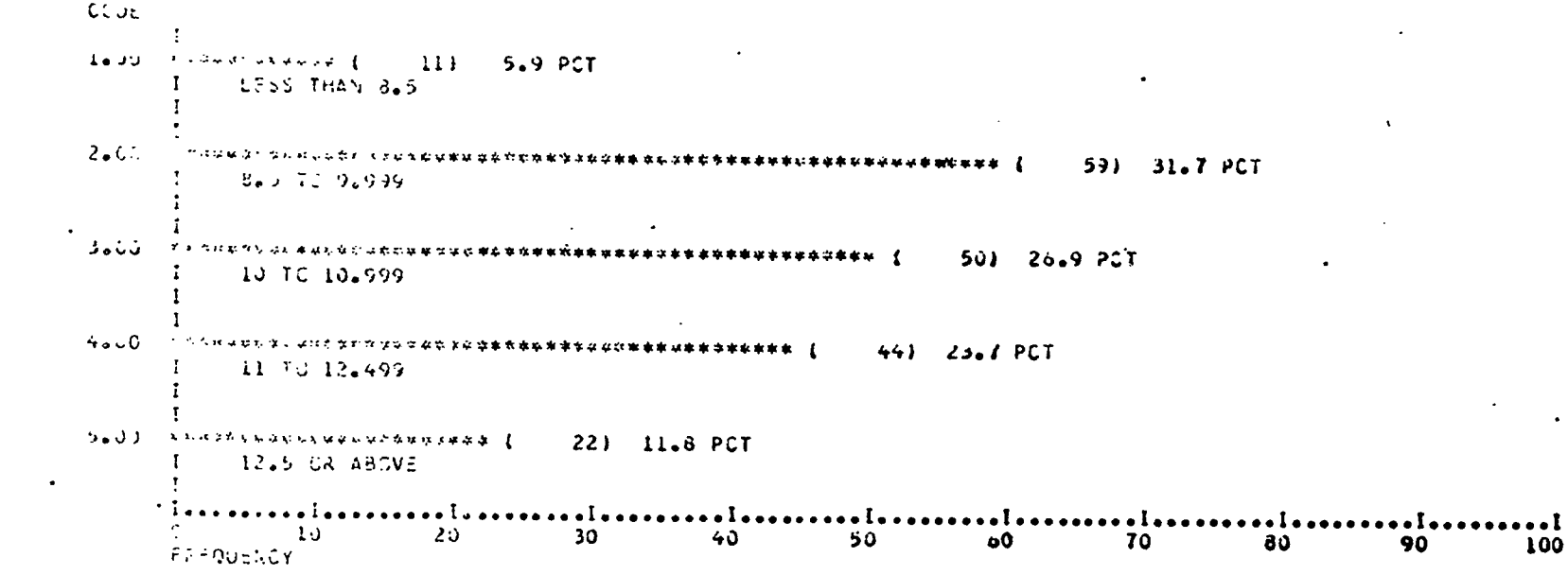
VALID OBSERVATIONS = 186
MISSING OBSERVATIONS = 1 OR 0.5 PERCENT OF TOTAL

Table 1

* The measure of kurtosis in all the tables in this paper were calculated as $\frac{1}{n}\sum_{i=1}^{n}\left(\frac{x_i-\bar{x}}{s}\right)^4 - 3$. Thus, positive values indicate a distribution more peaked than the the normal distribution, and negative values indicate a distribution flatter than the normal.

FILE ... (CREATION DATE = 06/21/74)

VARIABLE LOGPOP LOG OF SCHOOL DISTRICT POPULATION



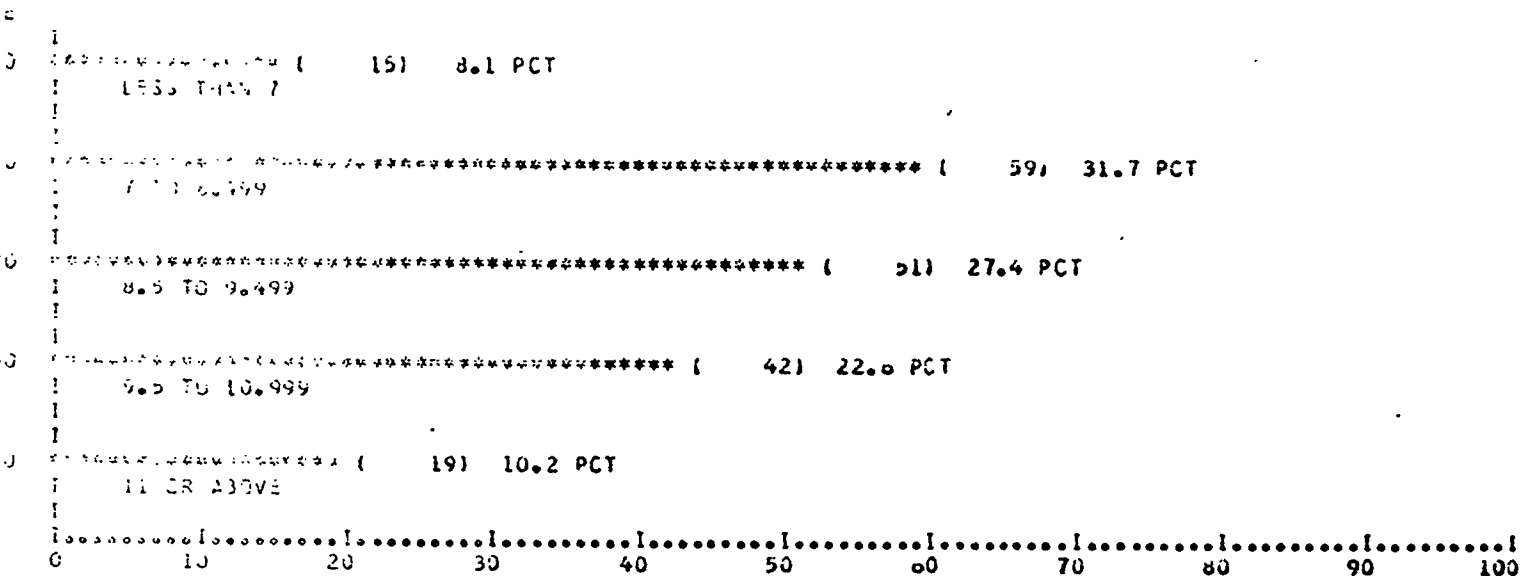
VALID OBSERVATIONS - 186
MISSING OBSERVATIONS - 0

62

Table 2

FILE NUMBER (CREATION DATE = 06/21/74)

VARIABLE LEGEND LOG OF SCHOOL DISTRICT ENROLLMENT



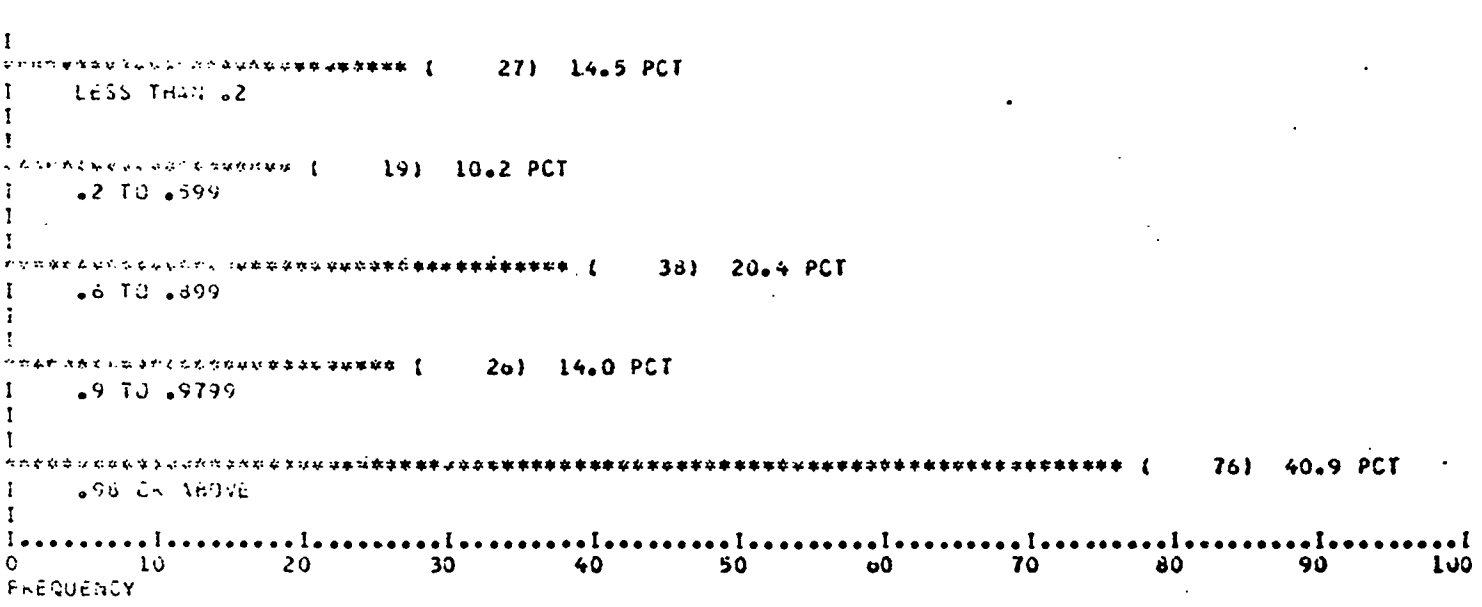
VALID OBSERVATIONS - 186
MISSING OBSERVATIONS - 0

Table 3

83

FILE NAME (CREATION DATE = 06/21/74)

VARIABLE PCURB PROPORTION OF POPULATION THAT IS URBAN



VALID OBSERVATIONS - 186
MISSING OBSERVATIONS - 0

64

Table 4

90

91

FILE NUMBER (CREATION DATE = 06/21/74)

VARIABLE PCBLK PROPORTION OF POPULATION THAT IS BLACK

MEAN	0.105	STD ERROR	0.010	MEDIAN	0.052
STD DEV	0.134	VARIANCE	0.018	KURTOSIS *	1.952
SKEWNESS	1.579	RANGE	0.583	MINIMUM	0.0
MAXIMUM	0.583				

VALID OBSERVATIONS - 166
MISSING OBSERVATIONS - 0 OR 0.0 PERCENT OF TOTAL

VARIABLE FITCATS PROPORTION OF FAMILIES WITH INCOME ABOVE $25000

MEAN	0.046	STD ERROR	0.003	MEDIAN	0.036
STD DEV	0.045	VARIANCE	0.002	KURTOSIS *	17.438
SKEWNESS	3.422	RANGE	0.359	MINIMUM	0.0
MAXIMUM	0.359				

VALID OBSERVATIONS - 180
MISSING OBSERVATIONS - 0 OR 0.0 PERCENT OF TOTAL

VARIABLE POPOOR PROPORTION OF FAMILIES BELOW POVERTY INCOME

MEAN	0.107	STD ERROR	0.005	MEDIAN	0.090
STD DEV	0.073	VARIANCE	0.005	KURTOSIS *	5.232
SKEWNESS	1.373	RANGE	0.452	MINIMUM	0.017
MAXIMUM	0.469				

VALID OBSERVATIONS - 166
MISSING OBSERVATIONS - 0 OR 0.0 PERCENT OF TOTAL

* See Table 1.

urban. Additional summary statistics for proportion urban are in Table 1.

The statistical behavior for proportion black in the 186 survey sample school districts is similar to that for proportion urban, on the opposite end of the range. Just over 40 percent of the districts have less than 2 percent black. The mean and median proportions black are respectively .105 and .052, with a range of 0 to .583 (these are proportions black in the total population of the school districts, not black enrollments in the districts or individual schools). Additional summary statistics and a histogram are in Tables 5 and 6 respectively.

Finally, we consider the two income variables: proportion of families over $25,000 income and proportion of families below the poverty level. Their means are respectively .046 and .107. They are both somewhat skewed to the right, with a few extreme values. Proportion over $25.000 has a maximum of .359, but only 8 percent of the districts are over .100. Similarly, the proportion of families in poverty is as high as .469, but only 10 percent of the districts are over .200. See Tables 5, 7, and 8. Both income variables are rather sharply peaked, especially the proportion over $25,000. The proportion over $25,000 is between .02 and .05 for half of the districts.

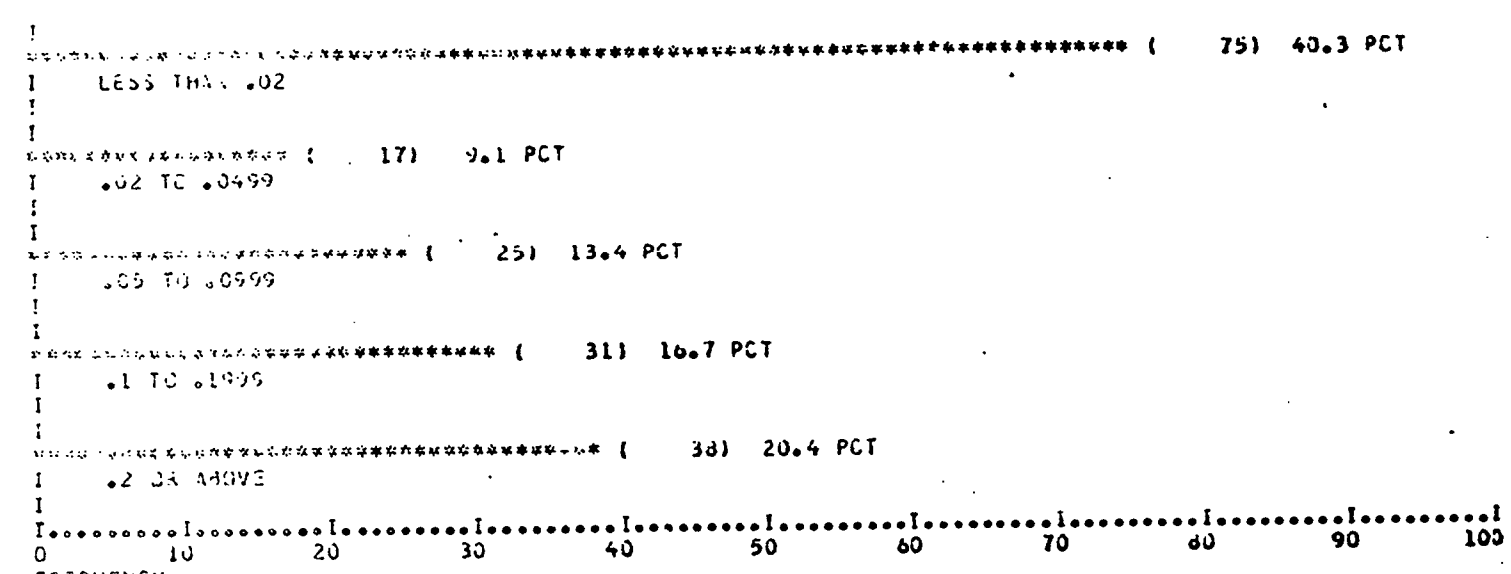
For an indication of relations among these six variables in the sample, see Table 9.

The shape of the distribution for proportion of families over $25,000 suggests a possible transformation for use in the modeling of innovativeness. A square root transformation, e.g., sharply reduces the kurtosis. It also brings the mean and median much closer together. Square root transformations on proportion poor, proportion black, and proportion urban have similar effects, though not nearly so dramatically as with proportion above $25.000.

We now want to consider how these sample statistics compare with national averages for these variables.

(DISTRIBUTION DATE = 06/21/74)

VARIABLE PCBLK PROPORTION OF POPULATION THAT IS BLACK

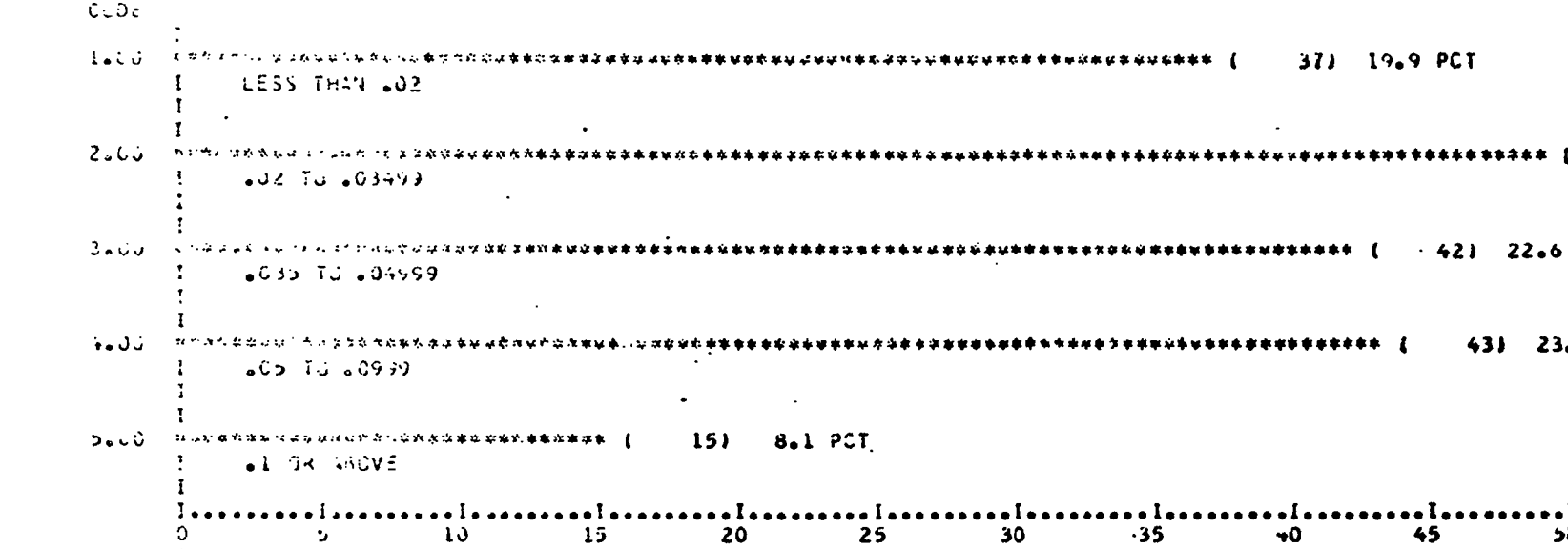


VALID OBSERVATIONS - 186
MISSING OBSERVATIONS - 0

Table 6

FILE NAME (CREATION DATE = 06/21/74)

VARIABLE FATCATS PROPORTION OF FAMILIES WITH INCOME ABOVE $25000

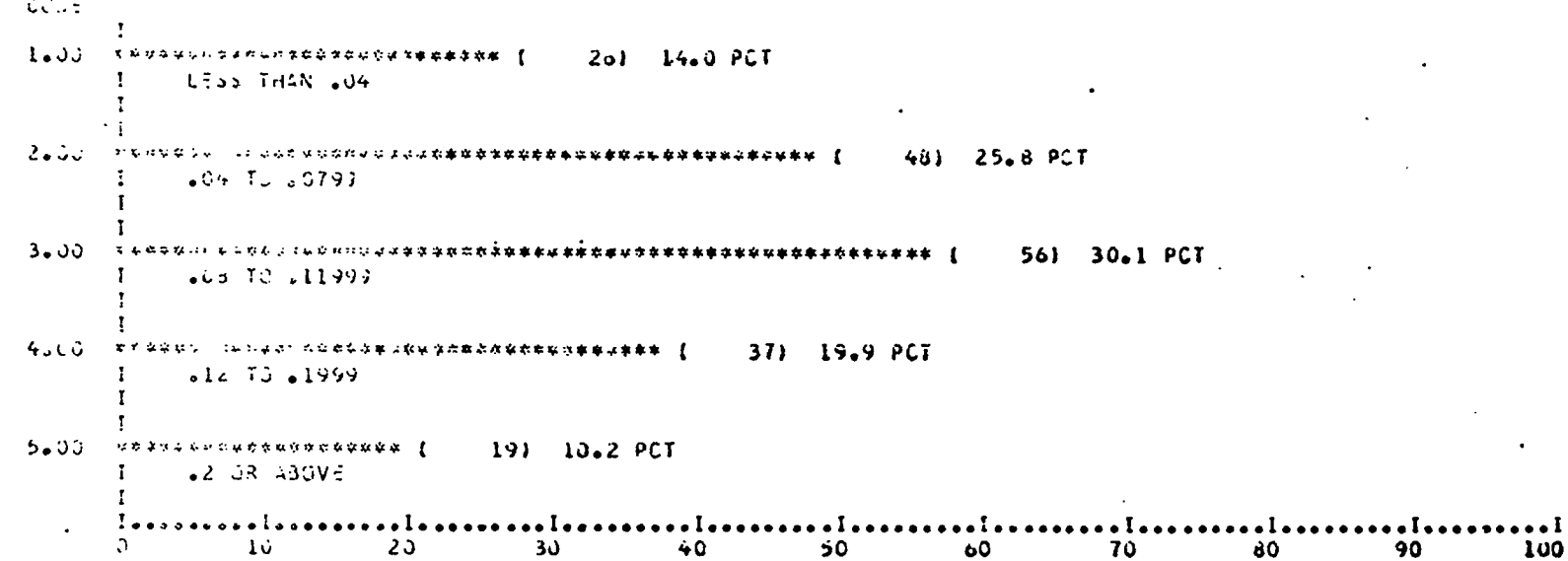


VALID OBSERVATIONS - 186
MISSING OBSERVATIONS - 0

Table 7

FILE NAME (CREATION DATE = 06/21/74)

VARIABLE PCPOOR PROPORTION OF FAMILIES BELOW POVERTY INCOME



VALID OBSERVATIONS - 186
MISSING OBSERVATIONS - 0

69

Table 8

FILE [illegible] (CREATION DATE = 06/21/74)

PEARSON CORRELATION COEFFICIENTS

	LOGPOP	LOGENRL	PCURB	PCBLK	FATCATS	PCPOOR
LOGPOP	1.0000 (0) S=0.000	0.9694 (186) S=0.001	0.6257 (186) S=0.001	0.2856 (186) S=0.001	0.0510 (186) S=0.489	-0.1769 (186) S=0.015
LOGENRL	0.9694 (186) S=0.001	1.0000 (0) S=0.001	0.6068 (186) S=0.001	0.2559 (186) S=0.001	0.0246 (186) S=0.739	-0.1554 (186) S=0.037
PCURB	0.6257 (186) S=0.001	0.6068 (186) S=0.001	1.0000 (0) S=0.001	0.0783 (186) S=0.288	0.2669 (186) S=0.001	-0.2890 (186) S=0.001
PCBLK	0.2856 (186) S=0.001	0.2559 (186) S=0.001	0.0783 (186) S=0.288	1.0000 (0) S=0.001	-0.1683 (186) S=0.010	0.4177 (186) S=0.001
FATCATS	0.0510 (186) S=0.489	0.0246 (186) S=0.739	0.2669 (186) S=0.001	-0.1683 (186) S=0.010	1.0000 (0) S=0.001	-0.4425 (186) S=0.001
PCPOOR	-0.1769 (186) S=0.015	-0.1554 (186) S=0.037	-0.2890 (186) S=0.001	0.4177 (186) S=0.001	-0.4425 (186) S=0.001	1.0000 (0) S=0.001

(COEFFICIENT / (CASES) / SIGNIFICANCE) (A VALUE OF 99.0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED)

70

Table 9

101

102

Representativeness

We would like to know the distributions of the six variables we are using over all school districts in the U.S. Testing the representativeness of the sample would then be a straightforward matter.

What we have instead are estimates of the national means for the six variables, gathered from a variety of sources. They are national aggregate figures, not means over school districts. And we must rely on the sample itself for variance-covariance estimates. From [3], we have national means for proportion of population that is urban in 1970 of .735, and for proportion black .111. From [5], we have estimates for proportion of families over $25,000 income in 1969 of .063, and for proportion poor .097. From [3 and 4], we have total population in 1970, total public school enrollment in fall 1969, and number of operating public school districts, from which we calculate log of population per district and log of enrollment per district as 9.926 and 7.777 respectively. We thus have significant overestimates of population, enrollment, and proportion poor, and especially for the first two. We have an underestimate for proportion of families above $25,000 income. Proportions urban and black are almost equal to the population estimates.

Using a multi-variate generalization (the T^2-statistic) of the t-test, we test for equality of vector means between the sample and population. We find that the difference between the two vector means is statistically significant at the .001 level*, implying that the survey sample is not very representative of the total population.

---

*For μ = the vector of population means, $\bar{x}$ = the vector of sample means, S = sample covariance matrix, N = the number of observations (in this case 186), and p = the number of variables (in this case six), the T^2-statistic is given by $T^2 = N(\bar{x}-\mu)' S^{-1}(\bar{x}-\mu)$. Then $\frac{T^2_\alpha \cdot (N-p)}{(N-1)p} = F_{p,N-p}(\alpha)$. See, e.g., Anderson [1]. In this case, $T^2 = 279.66$, $\frac{T^2 \cdot (N-p)}{(N-1)p} = 45.35$, and the .999 point of $F_{6,120} = 4.04$.

It appears that the survey sample has significantly larger than average school districts. This is at least partly because of selection criteria that eliminated from consideration the very small school districts (see Section I, and [2]). The smallest in the sample has an enrollment of 327. In fact, more than one-third (36.9 percent) of all public school districts in fall 1969 had fewer than 300 students enrolled. But this accounts for only 1.5 percent of all students enrolled, so log of enrollment per district would increase only about .44 if we calculated the population mean only for districts with enrollments of more than 300 (the enrollment figures are from Table 1 of [4]. The difference between population and sample means would still be more than 7 times the standard error of the estimate of the sample mean. In fact, even if we eliminate both population and enrollment, and run the test on just the other four variables, the difference between population and sample vector means is still significant at the .001 level.*

We should, of course, recall that our population means are not really means over all school districts; they are means calculated from aggregate data. To the degree that the means used here reflect the true population means over school districts, our survey sample is not very representative of school districts in general. Our districts are much larger both in population and school enrollment, have proportionately more poor families and fewer families who had incomes over $25,000. The sample seems representative on the whole in terms of proportion black and proportion urban, though these variables are both highly skewed in the sample. To the degree that our population means are accurate reflections of school district means, we can clearly say that the school districts in our survey sample are not typical school districts, at least in terms of the variables considered here. This limits the generalizability of the results.

---

*The formulation is the same as before, except that now $p = 4$, and μ, $\bar{x}$ and S are reduced in size. For this case, $T^2 = 33.18$, $\frac{T^2(N-p)}{(N-1)p} = 8.16$, and the .999 point of $F_{4,120} = 4.95$.

What is suggested by the above discussion is that school districts that have any Change Agent projects at all, regardless of how successful they may be, are atypical school districts. Our results may then be generalizable to all school districts that have at least one project in operation.

New York City

As pointed out earlier, New York City is not included in any of the above analysis. Nine of the 32 community school districts within New York City are included in the survey sample. These districts are compared to city aggregates in Table 10. The nine community districts included in the survey sample appear to be representative of city aggregates, at least on the three variables population of school district, public school enrollment of the district, and proportion of population in the district that is black.

III. THE FIELD WORK SAMPLE

Census Characteristics

To describe the field work sample, we use the six variables used in Section II, with the addition of proportion Spanish language, i.e., the proportion of the population in the school district for whom Spanish is the major language. Again, New York City will be considered separately. This leaves a sample of 22 school districts.

For the field work sample, we find means for log of population and log of enrollment of 11.614 and 10.051, corresponding to population and enrollment levels respectively of about 110,000 and 23,000. These are both substantially higher than the means for the survey sample. Means and medians are again nearly equal, though the distributions for both log population and log enrollment are somewhat flatter for the field work sample than for the survey sample. The enrollment range is also narrower--from 1,362 to 650,000. See Table 11.

New York City Community School Districts

District #	Population	Log(pop)	Enrollment	Log(enrlmnt)	Prop. Black
2	567850	13.284	21507	9.976	.036
3	285482	12.562	21856	9.992	.281
4	127463	11.756	21379	9.970	.382
7	161594	11.993	30041	10.310	.358
10	314782	12.660	27693	10.229	.079
11 *	291618	12.583	26646	10.190	.147
14	211653	12.264	29739	10.300	.167
24	337814	12.730	23085	10.047	.043
32	114641	11.650	21235	9.963	.261
Sample means		12.387		10.109	.195
min.		11.650		9.963	.036
max.		13.284		10.310	.382
N.Y.C. Totals	7892267		1116711		.211
N.Y.C. district means **		12.416		10.460	

Table 10

* Community district 11, Parkchester in The Bronx, is the only one in the field sample.

** These are logs of average district values.

FILE NONAME (CREATION DATE = 06/21/74)

VARIABLE LOGPOP LOG OF SCHOOL DISTRICT POPULATION

MEAN	11.614	STD ERROR	0.382	MEDIAN	11.618
STD DEV	1.791	VARIANCE	3.209	KURTOSIS *	-1.082
SKEWNESS	0.073	RANGE	6.408	MINIMUM	8.629
MAXIMUM	15.037				

VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0 OR 0.0 PERCENT OF TOTAL

VARIABLE LOGENRL LOG OF SCHOOL DISTRICT ENROLLMENT

MEAN	10.051	STD ERROR	0.361	MEDIAN	9.859
STD DEV	1.695	VARIANCE	2.874	KURTOSIS *	-1.032
SKEWNESS	0.187	RANGE	6.177	MINIMUM	7.217
MAXIMUM	13.394				

VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0 OR 0.0 PERCENT OF TOTAL

Table 11

*See Table 1.

VARIABLE PCURB PROPORTION OF POPULATION THAT IS URBAN

MEAN	0.932	STD ERROR	0.038	MEDIAN	0.998
STD DEV	0.178	VARIANCE	0.032	KURTOSIS*	2.057
SKEWNESS	-1.752	RANGE	0.635	MINIMUM	0.365
MAXIMUM	1.000				

VALID OBSERVATIONS = 22
MISSING OBSERVATIONS = 0 OR 0.0 PERCENT OF TOTAL

VARIABLE PCBLK PROPORTION OF POPULATION THAT IS BLACK

MEAN	0.130	STD ERROR	0.029	MEDIAN	0.103
STD DEV	0.137	VARIANCE	0.019	KURTOSIS*	1.956
SKEWNESS	1.433	RANGE	0.542	MINIMUM	0.0
MAXIMUM	0.542				

VALID OBSERVATIONS = 22
MISSING OBSERVATIONS = 0 OR 0.0 PERCENT OF TOTAL

VARIABLE SPNLAN PROPORTION WITH SPANISH AS MAJR LANGUAGE

MEAN	0.053	STD ERROR	0.016	MEDIAN	0.020
STD DEV	0.077	VARIANCE	0.006	KURTOSIS	4.044
SKEWNESS	2.114	RANGE	0.307	MINIMUM	0.003
MAXIMUM	0.310				

VALID OBSERVATIONS = 22
MISSING OBSERVATIONS = 0 OR 0.0 PERCENT OF TOTAL

Table 12

See Table 1.

The field work sites are typically more urban than the other sites in the survey sample. The mean proportion of the school district population that is urban is .902. But over two-thirds (68.2 percent) of the districts are at least 98 percent urban, and the median value is 99.8 percent urban. Only two of the 22 districts are below 60 percent urban, compared to 46, or 24.7 percent, of the survey sample. See Tables 12 and 13.

Proportions black and Spanish language are more similar for the two samples. Mean proportion black is .130, which is somewhat higher than the .105 mean for the survey sample but is within one standard error of the estimate of the (field sample) mean. The shapes of the distributions for the two samples are almost identical. Compare Table 5 and 12. Mean proportions Spanish language are .053 for the field work sample and .060 for the survey sample. The distributions are also very similar for proportion Spanish language across the two samples. For the field sample, proportion Spanish language ranges from .003 to .310, with a median of .020. Seven of the 22 have less than 1 percent Spanish language, and 3 have less than 1/2 percent. See Table 12.

Family incomes are typically higher in the field work districts, with both a higher proportion over $25,000 income and a lower proportion poor, than for the survey districts as a whole, but the differences in means are very small. The distributions are much flatter and cover a narrower range in the field sample. Proportion of families with incomes over $25,000, e.g., ranges from .012 to .127, has a mean of .051, a median of .040, and a kurtosis measure almost equal to the value for a normal distribution in the field sample. The corresponding values for the survey sample are 0 to .359, .046, .036, and a kurtosis measure far from that of a normal distribution (in the direction of greater peakedness). See Table 14.

Representativeness

The comparison of vector means between the survey and field work samples is a more straightforward operation than the comparison in

FIELD ALAN SMALL OF SCHOOL DISTRICTS

FILE NJJAMI (CREATION DATE = 06/21/74)

VARIABLE PTURB PROPORTION OF POPULATION THAT IS URBAN

CODE			
2.00	********** (	2)	9.1 PCT
	.2 TO .599		
3.00	********** (	4)	18.2 PCT
	.6 TO .799		
4.00	***** (	1)	4.5 PCT
	.9 TO .9799		
5.00	********** (	15)	68.2 PCT
	.93 OR ABOVE		

0 2 4 6 8 10 12 14 16 18 20

FREQUENCY

VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0

78

Table 13

112

110

FILE NONAME (CREATION DATE = 06/21/74)

VARIABLE FAT04TS PROPORTION OF FAMILIES WITH INCOME ABOVE $25000

MEAN	0.051	STD ERROR	0.007	MEDIAN	0.040
STD DEV	0.033	VARIANCE	0.001	KURTOSIS *	0.056
SKEWNESS	1.009	RANGE	0.115	MINIMUM	0.012
MAXIMUM	0.127				

VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0 OR 0.0 PERCENT OF TOTAL

VARIABLE POP30R PROPORTION OF FAMILIES BELOW POVERTY INCOME

MEAN	0.069	STD ERROR	0.011	MEDIAN	0.077
STD DEV	0.053	VARIANCE	0.003	KURTOSIS *	0.936
SKEWNESS	1.045	RANGE	0.215	MINIMUM	0.019
MAXIMUM	0.234				

VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0 OR 0.0 PERCENT OF TOTAL

79

Table 14

*See Table 1.

Section II between the survey sample and the population of all school districts. Here, we have identical data for both samples, so we don't have to estimate population means from other sources, and we know the covariances for the population.

In testing for equality of vector means between the field work and survey samples, we find that the differences are not significant at the 5 percent level.* The field sites, then, are roughly representative of the whole survey sample, at least on the seven variables considered, even though the field sites tend to be substantially larger and more urban school districts.

New York City

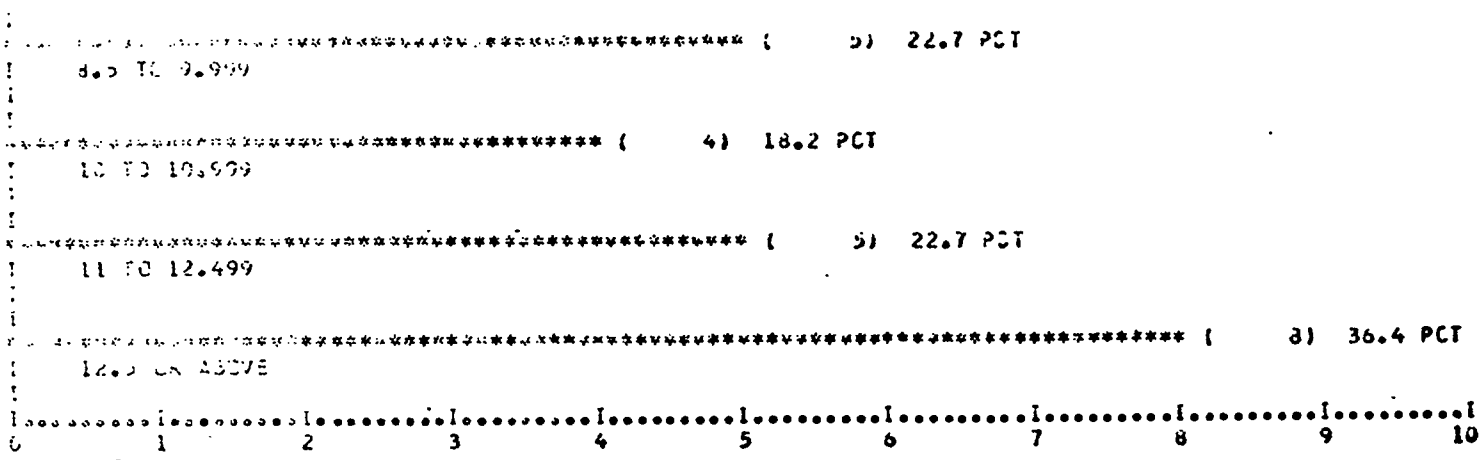
Of the 9 community school districts in New York City that are included in the survey sample, one is in the field sample. That one is community district number 11. It is very close to the average of the other 8 in population and enrollment and somewhat lower in proportion black. See Table 10.

Tables included in this Appendix provide summary descriptions for each of the field sites (excluding New York City) used for in-depth study. Tables 15-1 to 15-7 give histograms for the 7 variables used in Section III. The five categories from each histogram provide a convenient way for comparing any field site with the others in the sample. The categories are given for each variable for each school district in Table 15-8 (refer back to Tables 15-1 to 15-7 for definitions of variables and categories).

---

*Let μ = the vector of means for the survey sample, $\bar{x}$ = the vector of means for the field work sample, Σ = the covariance matrix for the survey sample, N = the number of observations (in this case 22), and p = the number of variables (in this case 7). Then $N(\bar{x}-\mu)' \Sigma^{-1}(\bar{x}-\mu)$ is distributed as χ^2_p. See, e.g., Anderson [1]. In this case, $N(\bar{x}-\mu)' \Sigma^{-1}(\bar{x}-\mu) = 12.183$, the .90 point of $\chi^2_7 = 12.0$, and the .95 point of $\chi^2_7 = 14.1$.

VARIABLE LOGPOP LOG OF SCHOOL DISTRICT POPULATION

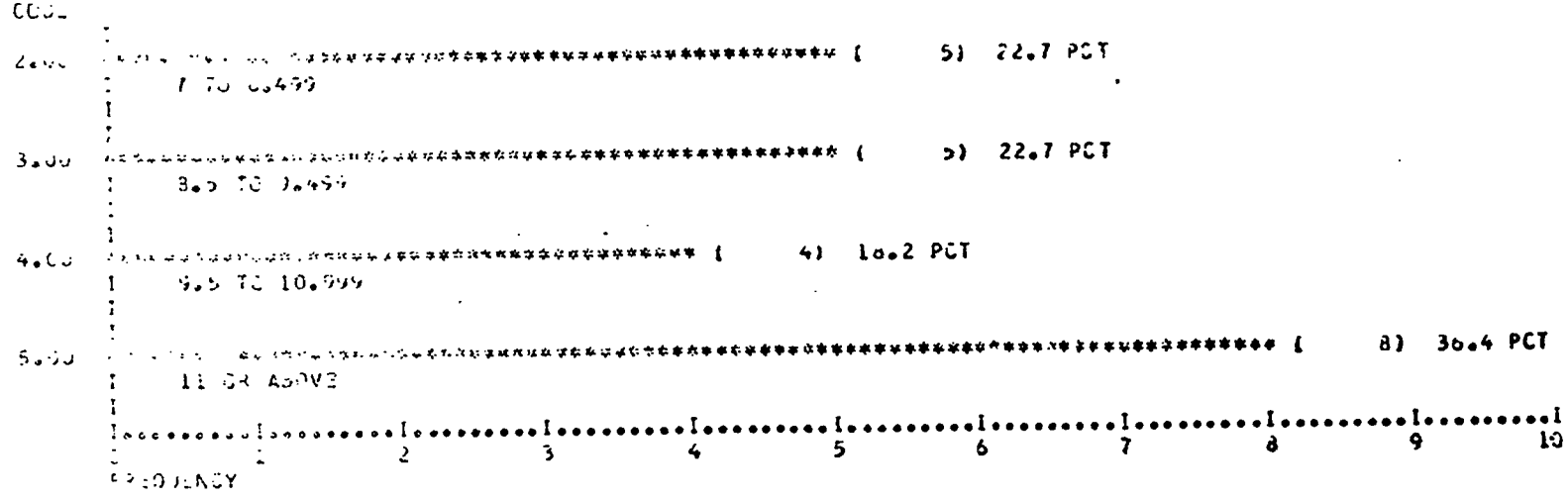


VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0

Table 15-1

FILE NONAME (CREATION DATE = 06/21/74)

VARIABLE LOGTOTAL LOG OF SCHOOL DISTRICT ENROLLMENT



VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0

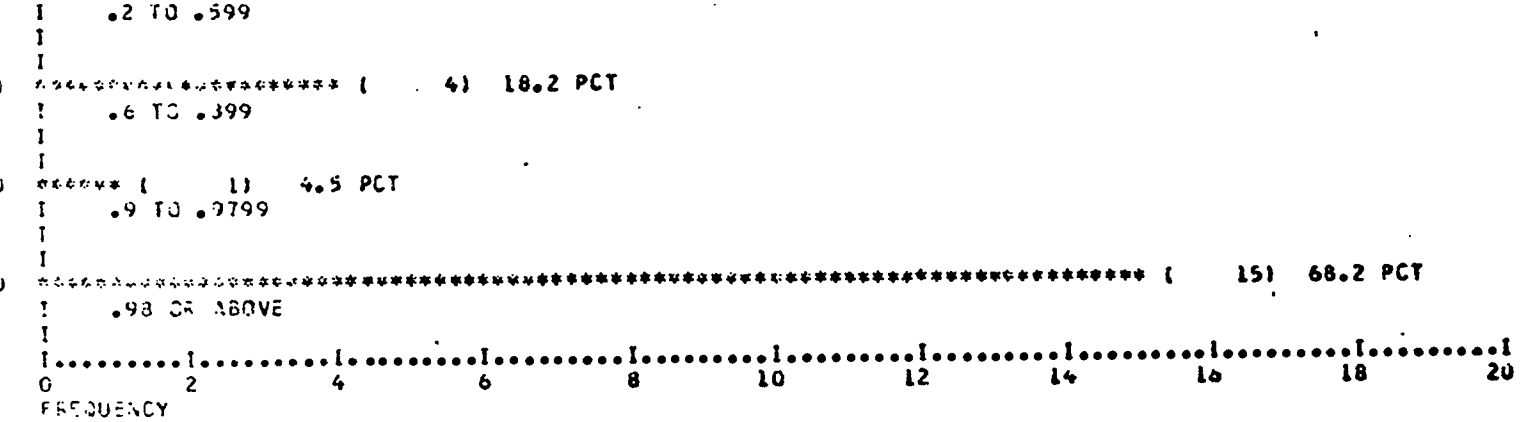
82

Table 15-2

110

FILE NAME (CREATION DATE = 06/21/74)

VARIABLE PCURB PROPORTION OF POPULATION THAT IS URBAN

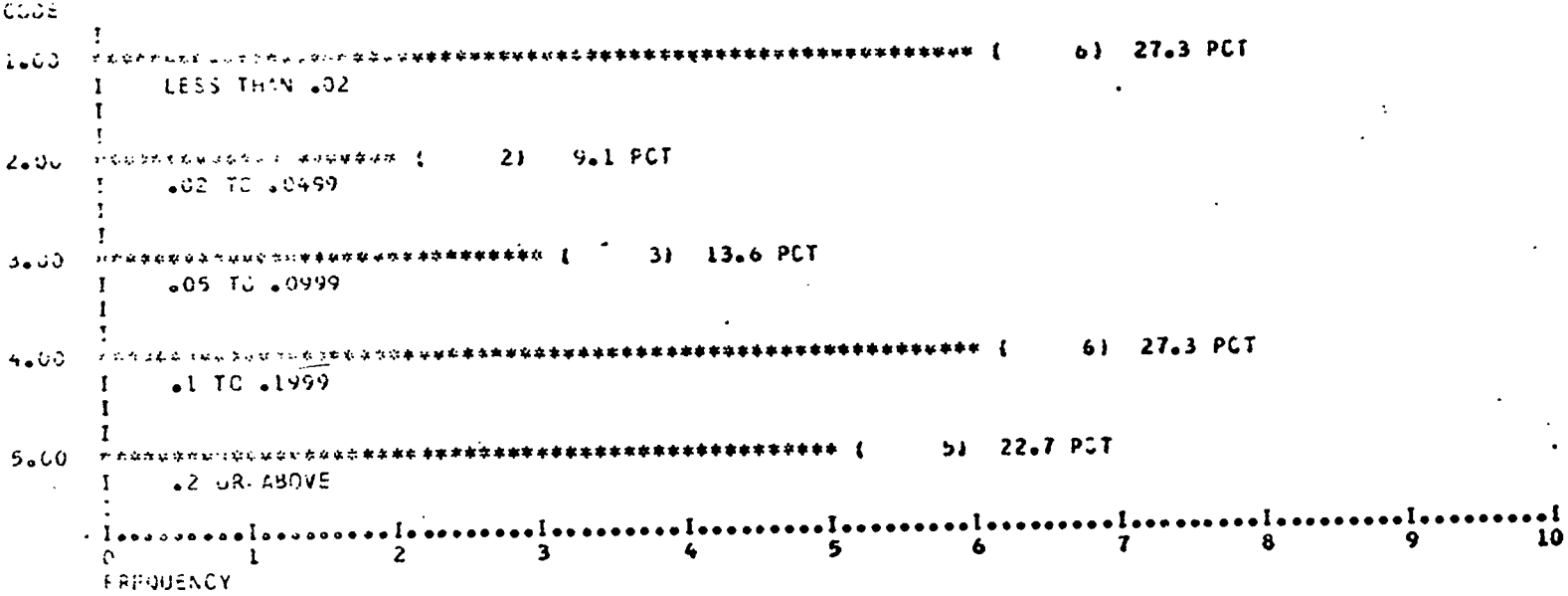


VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0

Table 15-3

FILE NONAME (CREATION DATE = 06/21/74)

VARIABLE PCBLK PROPORTION OF POPULATION THAT IS BLACK

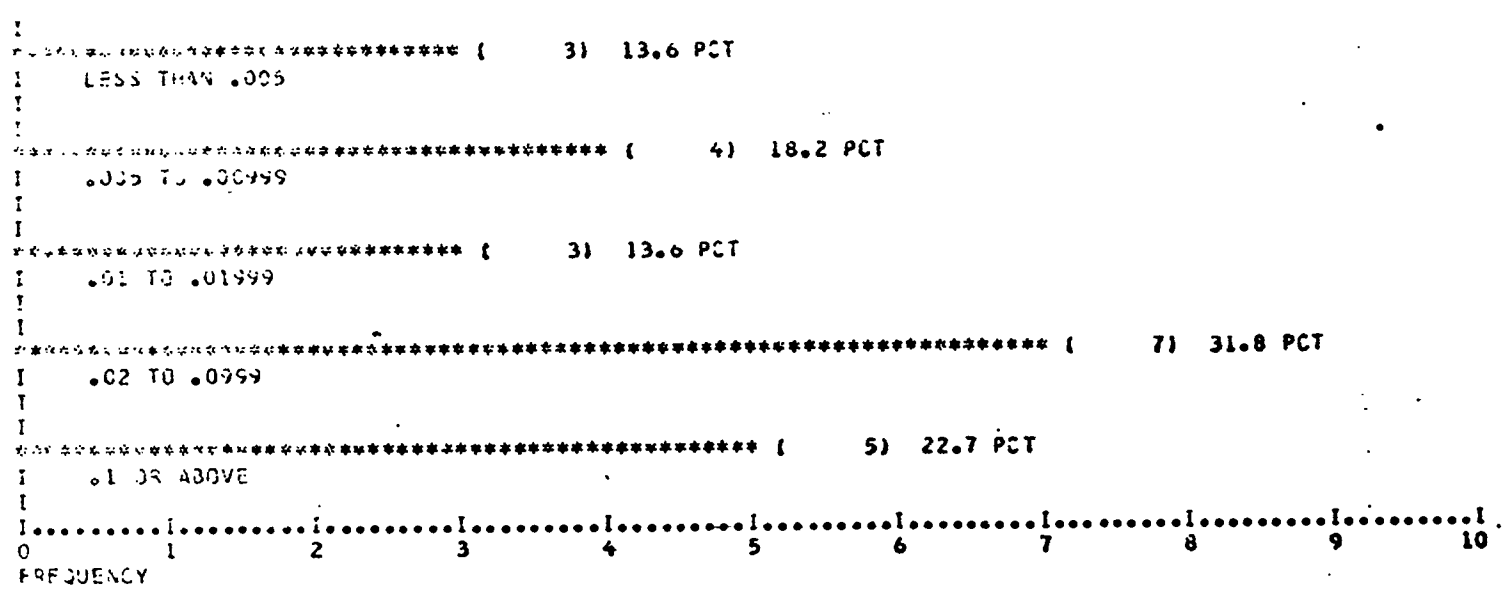


VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0

Table 15-4

FILE [illegible] (CREATION DATE = 06/21/74)

VARIABLE SPANL. PROPORTION WITH SPANISH AS MAJR LANGUAGE



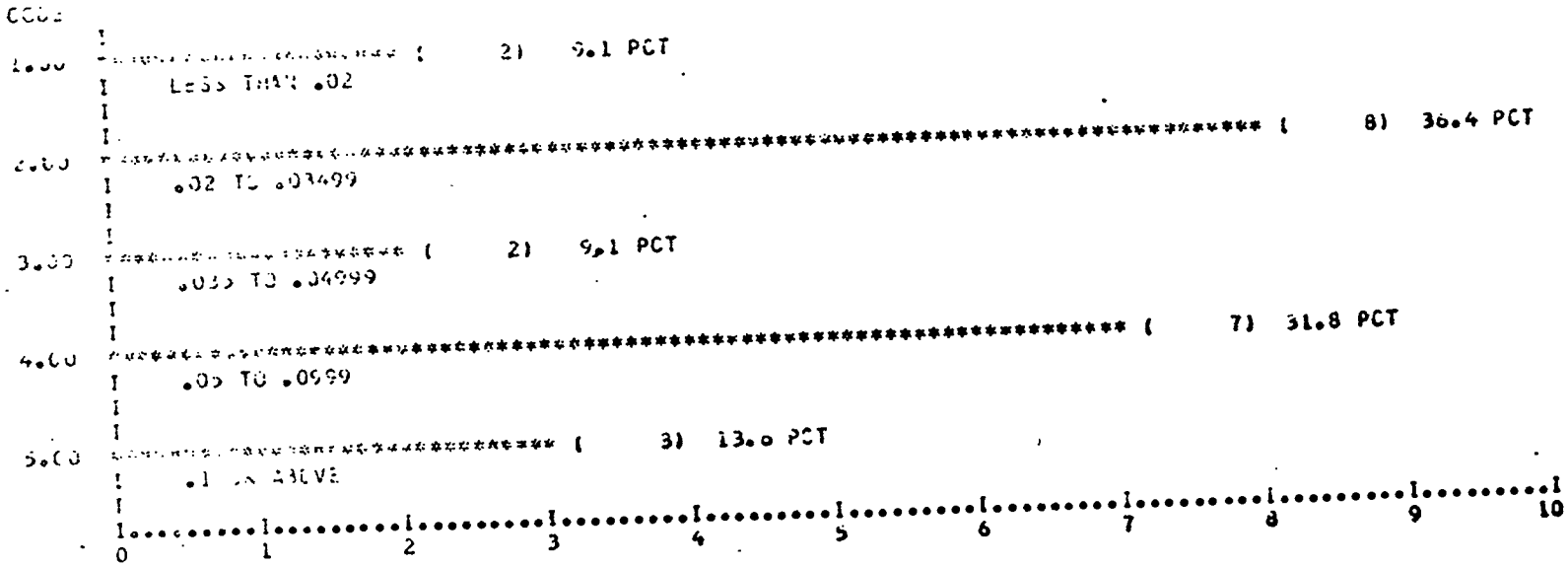
VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0

Table 15-5

[illegible] SCHOOL DISTRICTS

FILE [illegible] (CREATION DATE = 06/21/74)

VARIABLE FATCATS PROPORTION OF FAMILIES WITH INCOME ABOVE $25000



VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0

98

126

127

Table 15-6

FILE (CREATION DATE = 05/21/74)

VARIABLE POPCOR PROPORTION OF FAMILIES BELOW POVERTY INCOME

```
CODE
      I
1.00  ********************************** (      3)  13.6 PCT
      I    LESS THAN .04
      I
      I
2.00  ********************************************************************************** (      8)  36.4 PCT
      I    .04 TO .0799
      I
      I
3.00  ************************************************************ (      6)  27.3 PCT
      I    .08 TO .11999
      I
      I
4.00  ********************************************* (      4)  18.2 PCT
      I    .12 TO .1999
      I
      I
5.00  ********** (      1)   4.5 PCT
      I    .2 OR ABOVE
      I
      I.........I.........I.........I.........I.........I.........I.........I.........I.........I
      0         1         2         3         4         5         6         7         8         9         10
      FREQUENCY
```

VALID OBSERVATIONS - 22
MISSING OBSERVATIONS - 0

School District	LOGPOP	LOGENRL	PCURB	PCBLK	SPNLAN	FATCATS	PCPOOR
Cleveland	5	5	5	5	4	2	4
Seattle	5	5	5	3	4	4	2
Cobb County, Ga.	4	4	3	2	3	2	2
Pikeville, Ky.	2	2	3	2	1	4	5
Wake, N.C.	4	4	2	5	1	2	4
Warren, Ohio	4	4	5	4	3	2	2
Mineola, N.Y.	3	2	5	1	4	4	1
Cortez, Col.	2	2	3	1	4	2	4
Union City, Ca.	2	3	5	1	5	2	2
Houston	5	5	5	5	5	4	3
Oberlin, Ohio	2	2	3	5	3	3	2
San Diego	5	5	5	3	5	4	3
Albany	4	3	5	4	3	4	3
Wayne, N.J.	3	3	5	1	3	5	1
Los Angeles	5	5	5	4	5	4	3
Bethalto, Ill.	2	2	2	1	1	1	2
Lansing	4	4	5	3	4	3	2
Paramus, N.J.	3	3	5	1	4	5	1
Newark	5	5	5	5	5	2	4
University City, Mo.	3	3	5	4	3	5	2
Boston	5	5	5	4	4	2	4
Milwaukee	5	5	5	4	4	2	3

Table 15-8

REFERENCES

1. Anderson, T. W., *An Introduction to Multivariate Statistical Analysis*, Wiley and Sons, Inc., New York, 1958.

2. Pincus, J., P. Greenwood, G. Bass, P. Berman, T. Endo, M. McLaughlin, A. Pascal, R. Rasmussen, R. Riley, G. Sumner, and J. Wirt, *Revised Study Design and Progress Report for Change Agent Study*, The Rand Corporation, WN-8487-HEW, November 1973.

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4. Sietsema, J. P., and B. O. Mongello, *Education Directory 1969-70 Public School Systems*, National Center for Educational Statistics, U.S. Department of Health, Education and Welfare, 1970.

5. U.S. Bureau of the Census, *Current Population Reports*, Series P-60, Nos. 75 and 76, Washington, D.C., 1970.